

# ENVIRON

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6/24/02

June 24, 2002

Mr. Matthew Ohl  
USEPA, HSRW-6J  
77 West Jackson Blvd.  
Chicago, IL 60604-3590

Re: Cone Penetration Testing  
Enviro-Chem Superfund Site  
Zionsville, Indiana

Dear Mr. Ohl:

This letter report has been prepared to present the results of the Cone Penetration Tests (CPTs) and Geoprobe® investigation recently conducted at the Environmental Conservation and Chemical Corporation (ECC) Superfund Site (the "Site"). The investigations were completed to better define the subsurface geology in the area of the proposed trench located outside of the remedial boundary, and in the areas of Hot Spots 1/1A and 2. These data, along with other previously collected geologic and hydrogeologic information will be used to determine the depth and alignment of the trench system as well as the placement of the Hot Spot extraction wells.

## ***CPT Investigation***

The CPTs were conducted from May 21 through May 23, 2002 by STRATIGRAPHICS of Glen Ellyn, Illinois. The tests were completed using a 34-ton CPT drill rig. Two test methods, standard soil resistance and electrical conductivity, were used to identify the subsurface lithology. Together these two methods were able to define a lithological unit with a resolution of approximately 3 inches. A third test method, pore water pressure response, was used in selected CPT locations within the Hot Spots. The pressure response was used as an indicator of the water content of the sand and gravel seams. A description of each of these CPT methods has been provided by STRATIGRAPHICS and is included in Attachment 1.

A total of 34 CPTs were completed at the ECC Site. Twenty-nine CPTs were conducted along the proposed transect of the southern extent of the proposed trench, three CPTs were conducted in the area of Hot Spot 1/1A, and two CPTs were conducted in the area of Hot Spot 2. The CPT locations are shown on Figure 1, and the CPT logs are included with the STRATIGRAPHICS report provided in Attachment 1. Each CPT location was sealed with high solid bentonite grout.

Due to the extremely wet conditions at the Site during the testing and the heavy weight of the CPT rig, the CPTs that were planned for the northern portion of the proposed eastern trench system could not be completed.

***Geoprobe® Investigation***

As a result of the inability of the heavy CPT rig to reach some of the proposed boring locations, a subsequent Geoprobe® investigation was conducted from June 5 through June 7, 2002. The lighter Geoprobe® rig successfully accessed the majority of the intended locations, and additional locations on the periphery of the Hot Spots were included in the Geoprobe® investigation. At each accessible boring location, the soil borings were completed using a piston sampler. Continuous soil cores were collected using four-foot long core barrels with dedicated polyethylene sleeves. The soil was described and classified by a qualified ENVIRON geologist using the Unified Soil Classification System (USCS). The geologist noted length, color, density, grain size, sorting, composition, structure, and moisture content, and organic vapor concentrations of the soil based on visual observations and measurements. Each Geoprobe® boring within the trench area was extended to a total depth of approximately 24 feet below ground surface (bgs), and the borings in the vicinity of the Hot Spot were extended to approximately 20 feet bgs. Each boring location was sealed with a bentonite slurry.

A total of 14 Geoprobe® borings were installed at the locations shown on Figure 1. The boring logs are included in Attachment 2.

Please do not hesitate to call us if you have any questions or require additional information concerning these tests.

Sincerely,

ENVIRON International Corporation



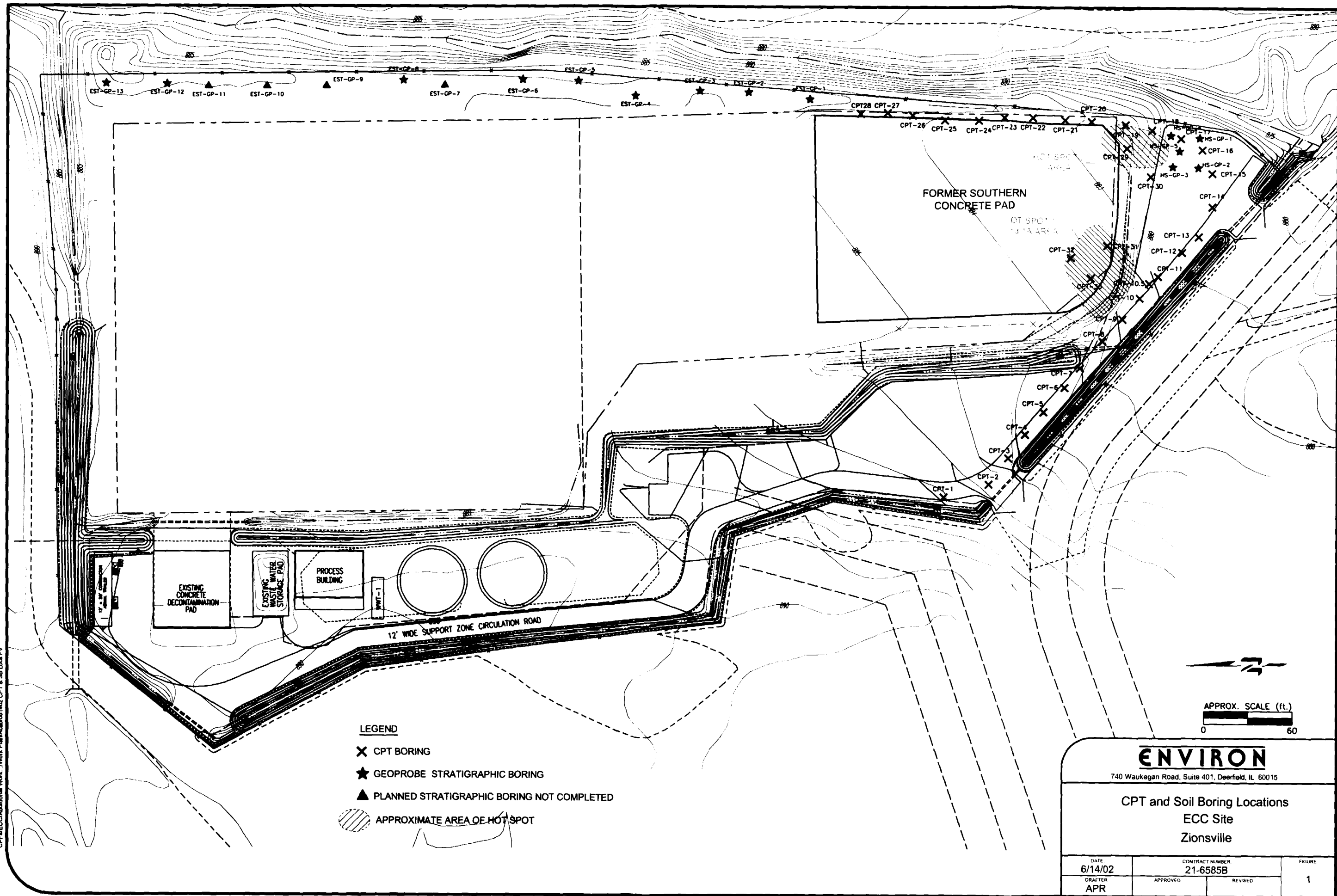
Scott C. Hayter, P.G.  
*Senior Associate*

SCH:als

cc: Mr. Michael Habeck – IDEM  
Mr. Tim Harrison – CH2M Hill  
Mr. Philip Smith – CH2M Hill  
Dr. Roy Ball – ENVIRON International Corporation  
Mr. Norman Bernstein – N. W. Bernstein & Associates, L.L.C.

## FIGURES

CPT-ECC/Additional Work /Work Plan/06/01/02 CPT & SB Locs FV



**ATTACHMENT 1**

**Stratigraphics Report**

**CONE AND PIEZOMETRIC CONE PENETRATION  
TESTING WITH SOIL ELECTRICAL  
CONDUCTIVITY MEASUREMENTS  
ECC TRUST SITE  
ZIONSVILLE, INDIANA**

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## 1.0 INTRODUCTION

STRATIGRAPHICS, The Geotechnical Data Acquisition Corporation, performed cone penetrometer exploration in Zionsville, Indiana at the ECC Trust Site for Environ International Corp. (Environ). We performed Cone and Piezometric Cone Penetration Test with soil Electrical Conductivity measurement (CPT-EC and CPTU-EC) soundings to provide data on hydrogeologic properties of site soils for evaluation by Environ.

The work was performed on May 21 through 23, 2002, and totaled about 2-1/2 days of field work. Thirty one CPT-EC soundings were performed, with 2 shallow refusals, to depths ranging from 22.6 to 30.4 ft, for a total of 866.7 ft of CPT-EC test. Three CPTU-EC soundings were completed to depths of 21.6, 28.4 and 29.8 ft for a total of 79.5 ft of CPTU-EC test. Two dissipation tests were performed during CPTU-EC soundings. All downhole equipment was pressure washed during retrieval and open hole was pressure grouted using bentonite grout at the completion of each penetrometer sounding.

This report includes CPT-EC and CPTU-EC sounding logs and tabulations of recorded data and correlated geotechnical parameters. The soundings are summarized on Table 1 and the pore water pressure dissipation testing on Table 2. Digital data and data summaries are presented for each CPT-EC and CPTU-EC sounding on the attached data disk, along with JPEG images of the logs. Details of penetrometer exploration techniques are included in the main body of the report.

## 2.0 PENETROMETER EQUIPMENT AND DATA ACQUISITION

2.1 Procedure The Cone Penetration Test (CPT) consists of smoothly and continuously pushing a small diameter, instrumented probe (penetrometer) deep into the ground while a PC data acquisition system displays and records the soil response to penetration (Figure 1). In geotechnical terms, the CPT penetrometer models a foundation pile under plunging failure load conditions. CPT data are used to develop continuous, high resolution profiles of in situ soil conditions rapidly, accurately and economically.

The soil resistance to penetration, acting on the tip and along the sides of the penetrometer, is measured during CPT. CPT soil resistance measurements are accurate and highly repeatable. The measurements can be used for the evaluation of stratigraphy and various geotechnical parameters. Performance of CPT is specified by ASTM Standard D3441.

A pressure transducer is added to the CPT penetrometer to acquire hydrogeologic data (Saines and others, 1989) and is called a Piezometric Cone Penetration Test (CPTU). A soil electrical conductivity sensor is added to the penetrometer (CPTU-EC) to acquire qualitative moisture information in vadose zone soils, and general groundwater quality data (Strutynsky and others, 1991, 1998). Penetrometer groundwater, soil, and soil gas samplers are used for direct sampling (Strutynsky and Sainey, 1990, Strutynsky and others, 1998). Recent advances in penetrometer instrumentation include a natural gamma sensor, induced UV fluorescence for detection of hydrocarbons and other compounds, and shear wave velocity and stress controlled testing for low and high strain soil deformation evaluation.

The penetrometer is mounted at the tip of a string of sounding rods. A hydraulic ram is used to push the rod string into the ground at a constant rate of 4 ft per minute. Electronic signals from downhole sensors are transmitted by a cable, strung through the sounding rods, to an uphole PC data acquisition system. Measurements are displayed and recorded for definition of subsurface conditions. Downhole equipment can be steam cleaned during retrieval. Open hole can be grouted using bentonite grout.

Large 3 or 4 axle trucks are used to carry the 2 penetrometer systems used by STRATIGRAPHICS. Truck weight and ballast serve to counteract the thrust of the hydraulic ram. Enclosed rig work areas allow all-weather operations. Computers, samplers, electrical power, lighting, compressed air, steam cleaner, grout pump, and water tank are all included on each rig, providing for self-contained operations. Other portable systems or systems for mounting on drill rigs can be used in areas with poor access or for overseas projects.

Lightning detection systems are mounted on the rigs to monitor dangerous weather conditions that can effect safety and productivity. Differential, carrier phase, post processed Global Positioning Systems (GPS) are also mounted on the rigs to allow surveying exploration locations.

No borehole is required during exploration because penetrometers are directly thrust into the soil from the ground surface. Pressures of over 3 million pounds per square foot can be applied to the tip of the penetrometer for penetration of most soils finer than medium gravel. Asphalt pavements up to 6 inches thick can usually be penetrated by penetrometer methods without pre drilling. Site disturbance is reduced since no borehole cuttings or drilling fluids are generated during penetrometer operations. Personnel exposure to contaminated soil is less than exposures during drilling and sampling operations. CPT equipment can be easily decontaminated during retrieval.



Four to thirteen hundred feet of CPT (with no time dependent piezometric or shear wave measurements) can be performed in a day, depending on site access. Depths of more than 200 ft can be achieved, depending on stratigraphy. Where soils are exceptionally dense or gravelly, an uninstrumented prepunch tool can be used for probing. Information obtained using the prepunch tool can be similar to mechanical (Dutch) cone data especially where friction on the rod string is minimal. Dynamic driving can be used in gravelly soils.

**2.1.1 Signal Conditioning and Recording** CPT data are acquired using a 16 bit (resolution of 1 part in 32,768) analog to digital data logger and PC computer. Sounding logs are graphically displayed and printed for immediate evaluation of subsurface conditions. Data are recorded on disk for data processing and archiving.

**2.2 Soil Shear Resistance Measurements** The soil penetration resistance is measured on the tip and along the sides of the CPT penetrometer using strain gage loadcells (Figure 1, Strutytsky and others, 1985). The conical tip of the penetrometer has a projected cross-sectional area of 15 square centimeters (2.3 sq. in., and a diameter of 1.7 inches. The cone tip resistance reflects the deep bearing capacity of a soil. Soil friction is measured along a cylindrical sleeve mounted behind the cone tip. The friction sleeve has a surface area of 200 square centimeters (31.0 sq. in.), a length of 5.8 inches, and a diameter slightly larger than the cone tip. The tip measurement has a layer resolution of about 2 to 4 inches, while the friction resolution is about 6 inches.

**2.3 Piezometric Measurements** A pressure transducer is used to measure the soil pore water pressure response to penetration. The advance of the penetrometer causes volumetric distortion of surrounding soils, which generates a local pore water pressure field. These generated pressures dissipate almost instantaneously in soils of high permeability, so equilibrium water pressures are measured during CPTU in coarse sand and gravel. In medium or low permeability soils, the generated pore water pressure field is sustained for a lengthy period of time (Saines and others, 1989). The dissipation of generated pressures can be recorded during pauses in penetration. The rate of dissipation is used to estimate soil hydraulic conductivity and consolidation characteristics. If the pauses are long enough for all generated water pressures to dissipate, potentiometric surface measurements can be obtained at multiple depths in a single CPTU sounding. The CPTU piezometric measurement has a layer resolution of about 1 inch.

**2.3.1 Piezometer Saturation** The CPTU piezometer filter is saturated with an incompressible liquid so that instantaneous response (zero lag time) can be achieved during testing. High filter saturation levels are indicated by sharp responses at interfaces and immediate regeneration of water pressure after pauses in penetration. Low filter saturation levels leading to poor measurements can be caused by inadequate filter preparation, soil suction, or filter damage on coarse soil particles. Clogging of piezometric filters can also lead to poor results. Loss of filter saturation or clogged filters are beyond the control of the operator. Thus, CPTU piezometric measurements can be less repeatable than CPT tip and friction sleeve resistance measurements.

**2.4 Electrical Conductivity and Thermal Measurements** A CPTU-EC penetrometer including tip, sleeve, piezometric, temperature, and electrical conductivity (EC) sensors can be used to simultaneously acquire geotechnical, hydrogeological and qualitative geochemical information. Soil EC is measured using a two electrode array, energized with a 3 kHz signal, mounted on the penetrometer tip. The EC measurement has a resolution of about 1 inch. The CPT thermal sensor is used to acquire soil thermal properties.

**2.5 Natural Gamma Measurements** A CPTU-EC-G penetrometer incorporating cone, friction, piezometric, soil electrical conductivity and natural gamma (G) sensors can be used to simultaneously acquire geotechnical, hydrogeological, qualitative geochemical and radiological information. Gamma measurements can be used to detect radionuclide contamination and to enhance lithologic evaluation.

**2.6 UV Fluorescence** A CPTU-EC-UVF penetrometer incorporating cone, friction, piezometric, soil electrical conductivity, and Ultraviolet Fluorescence (UVF) sensors can be used to simultaneously acquire geotechnical, hydrogeological, and qualitative geochemical information. The UVF system consists of a sapphire window in the penetrometer, a UV excitation light source, and photodiode light detectors. UV light is transmitted through the window into the adjacent soil. If the soil contains compounds such as petroleum hydrocarbons that fluoresce, the photodiodes are used to detect the resulting light. The UV light source is bandpass filtered to provide an excitation wavelength of 254 nm. The photodiode sensors are longpass filtered to monitor resulting fluorescent light emissions above 290 nm.

**2.7 CPT Seismic Wave Velocity Measurements** A geophone module is attached to the penetrometer to acquire P (compression) and S (shear) wave velocity data. CPT geophones have superior coupling to the soil, resulting in better definition of wave arrival, as compared to borehole deployed geophones. The CPT seismic system consists of three downhole geophones, an uphole wave source with timing trigger, signal conditioning, signal acquisition software, and the PC data acquisition computer. The test procedure is as follows: 1) the CPT penetrometer and geophone module is pushed to a test depth; 2) signal acquisition is initialized; 3) a hammer with timing trigger is used as a wave source; and 4) geophone output is recorded as a function of time. The procedure is repeated at multiple depths to allow calculation of interval wave velocities between adjacent tests.

A source rich in S-wave generation is used for S-wave tests. A sledge hammer is swung to horizontally strike the main leveling jack pad of the CPT rig. The 8-ft long steel jack pad, coupled to the ground surface by the weight of the CPT rig, transmits strong S-waves through the soil into a pair of horizontally opposed downhole geophones. The geophones are aligned with the jack pad to maximize the amplitude of the received signals.

A series of hammer blows is typically used for each test using signal stacking techniques. Signal stacking enhances data evaluation, as random noise rarely reinforces itself, while the repeated shear waves stack onto each other, increasing signal to noise ratios. The stacked output of the geophones typically results in obvious, high amplitude waves 180 degrees out of phase with each other at the instant of S-wave arrival.

After completion of a S-wave test, a P-wave test can be performed at the same depth. The sledge hammer is swung to vertically strike a steel plate placed on the ground next to the CPT rig. A series of blows is also used for each P-wave test. P-wave arrivals are recorded using the vertical CPT geophone.

P-wave arrivals are often much less obvious than S-wave as the amplitude of the P-wave is typically lower, the travel times are much shorter, and P-waves can easily be transmitted through the steel rod string connecting the penetrometer to the surface. The very fast P-wave transmission through the rod string at about 15,000 ft/sec, can set downhole geophones vibrating, thus masking the arrival of the slower soil P-wave. Occasionally, the S-wave geophones can also indicate P-wave arrival, differentiated from S-wave arrival by the fact that each geophone will vibrate in phase, rather than 180 degrees out of phase, as during S-wave arrival.

P-waves typically travel 2 to 4 times faster than S-waves. In saturated soils, the P-wave travels at about the speed of sound in water, about 5000 ft/sec. After arrival of the P-wave, the three downhole geophones will also pick up the arrival of the S-wave. This S-wave arrival during P-wave testing can be used to check S-wave arrivals measured during the first series of S-wave tests.

2.8 CPT-EMOD measurements The standard CPT procedure is conducted as a constant rate of strain test, resulting in a continuous measurement of soil ultimate bearing and frictional strength. By conducting CPT under monotonically increasing stress conditions, soil deformation properties can be evaluated. The CPT-EMOD test is conducted during short pauses in the continuous push process. Load/settlement data are analyzed using elastic theory, as might be done for a plate load test, for evaluation of Young's Modulus at various stress levels. 2.9 Penetrometer Geometry The CPT penetrometer external geometry is specified by ASTM standards. Differences in penetrometer internal design can lead to some variability in response between penetrometers of different manufacture, especially in very soft clays. The CPTU measurement of generated water pressure depends on external filter geometry. Measurements of equilibrium water pressures after pauses in the penetration process are not sensitive to geometry, and reflect undisturbed conditions.

CPTU piezometric filters are typically mounted on either the cone tip (U1 position) or just ahead of the friction sleeve (U2 position). Each position has advantages and disadvantages. Measurements taken with the cone tip U1 filter are at a maximum and show high resolution of thin soil seams. The cone tip U1 filter is prone to damage on coarse soil particles. Negative pressures are often measured in dense, silty or clayey sands and hard clays when using the U2 friction sleeve filter. These low pressures are probably caused by soil elastic rebound (expansion) as the soil moves from the intensely loaded region beneath the cone tip to the less loaded region next to the friction sleeve. Soil expansion can induce large suction forces on the U2 friction sleeve filter, which can result in decreased filter saturation levels.

Site characteristics and data usage determine which piezometric filter geometry is appropriate. The piezometric filter is placed at the U2 friction sleeve position on the STRATIGRAPHICS CPTU-EC penetrometer. The filter housing is internal to the cone tip. Generally good results can be obtained using this geometry when proper filter preparation techniques are followed.

2.10 Equipment Decontamination and Grouting The rod string is retrieved through a rodwasher mounted on the hydraulic ram assembly. High pressure hot water is sprayed from internal nozzles to clean the rod string. Wash water (about ½ gallon per 10 ft of rod) can be captured for disposal.

The STRATIGRAPHICS grouting system can be used to seal open hole. As penetrometers are being advanced, bentonite grout (about ¾ gallon per 10 ft of open hole) is pumped into the annular space formed between the smaller diameter sounding rods and the larger diameter penetrometer. A bypass is opened and additional grout is pumped to seal the hole during rod string retrieval. Pressure grouting during sounding advance can control cross-contamination between different strata. The grout decreases the contact of downhole equipment with contaminated soil. The grout also can decrease rod friction which may allow deeper penetration. Grout levels are checked after sounding completion, and more grout is added to account for penetration of grout into permeable strata.

### 3.0 PENETROMETER SAMPLING EQUIPMENT

Groundwater, soil gas, and soil samplers are deployed in the same manner as CPT penetrometers. Good sample isolation is achieved because no open hole exists during penetrometer operations.

**3.1 Groundwater Sampler** The STRATIGRAPHICS groundwater sampler is a shielded wellpoint sampler of heavy construction. The shield prevents sampler contamination while penetrating soils above the sampling depth. After shield retraction, groundwater flows under in situ pressure conditions, through a 20 inch long screen, into the 350 ml sample barrel. The sampler is retrieved to pour off the sample and for decontamination. Small diameter pumps can be used with the sampler to acquire large volumes of sample. This sampler can be deployed in any soil capable of being penetrated by the CPTU-EC penetrometer (Strutynsky and others, 1998).

A pressure transducer can be placed inside the sampler barrel. This allows the measurement of sample inflow rate. Analysis of inflow data using rising head slug test methods can provide a means of estimating soil hydraulic conductivities. If equilibrium conditions are reached, a measurement of the static water pressure head is obtained during groundwater sampling.

**3.2 Soil Gas Sampler** The STRATIGRAPHICS soil gas sampler is a shielded screen sampler, similar to the groundwater sampler. The shield is opened by pulling back the rod string during sampling, and soil gases are then extracted. The shield can be closed, and the rod string advanced to another depth, allowing multiple samples during a single rod trip. Soil gasses are extracted from the rod string. A vacuum box can be used to inflate Tedlar bags for off site analysis. Portable analytical equipment can be used to allow immediate soil gas profiling. The sampler, rod string and any sample tubing are purged before sampling using a vacuum pump.

**3.3 Soil Samplers** Fixed piston samplers can be used to obtain soil samples during penetrometer exploration. The STRATIGRAPHICS and MOSTAP 2-meter samplers are deployed similarly to a penetrometer. A piston, locked into the tip of the barrel to prevent soil from entering the sampler prematurely, is released at the top of the sampling interval, and the barrel is then advanced. Soil enters the barrel and is retained by a core catcher. The sampler is retrieved to remove the sample and for sampler decontamination.

The MOSTAP Sampler is used to obtain 1 inch diameter samples as long as 2 meters (78 inches). This sampler incorporates a PVC liner and a nylon stocking to allow retrieval of such a long sample. As the sample enters the sampler, it is encased in the nylon stocking. The stocking lessens soil friction around on the sample as it enters the PVC liner. At the end of the 2 meter run, the sampler is rotated to twist the stocking, helping retain the sample. This sampler can only be used in softer soils.

### 4.0 PIEZOMETER INSTALLATION TECHNIQUES

Penetrometer methods can be used to install piezometers for water level measurements, slug testing, groundwater sampling, and for remediation activities, such as sparging and soil vapor extraction (SVE). Various installation techniques are available (Saines and others, 1989). Proprietary, low volume change piezometers also can be installed using penetrometer equipment. These piezometers are often used for long term water pressure measurements during geotechnical projects. PVC piezometers are installed using a steel casing pushed to depth. The casing is sealed with an expendable tip which prevents soil from entering the casing during deployment. The PVC screen and risers are lowered into the casing, the casing is then withdrawn, leaving the PVC in place.

### 5.0 DATA REDUCTION

Test data are monitored as the soundings are performed. Data are recorded on hard disk and may consist of: depth, time, tip and sleeve resistance, generated water pressure, EC, UVF, temperature and natural gamma. Data are processed in-house and undergo quality control review prior to final reporting.

Several parameters can be computed to enhance data correlation:

friction ratio, FR (in %):

$$FR = f_s/q_c * 100$$

(Eq. 1); and

pore pressure ratio, Bq (dimensionless):

$$Bq = (U - U_e)/(q_c - S_v)$$

(Eq. 2);

where:  $f_s$  is the measured friction sleeve resistance, in TSF;

$q_c$  is the measured cone end bearing resistance, in TSF;

$U$  is the measured generated pore water pressure, in TSF;

$U_e$  is the measured or estimated equilibrium pore water pressure, in TSF; and

$S_v$  is the total soil overburden pressure, in TSF.

Measured data, computed and correlated parameters are presented in a graphical sounding log format for each sounding; numerical data are typically tabulated at 0.5 ft intervals. Digital data are also included on disk.

CPTU dissipation test data are recorded as a function of time during pauses in the penetration process. Dissipation data are normalized using the following equation:

$$\text{normalized dissipation level, } U^* \text{ (dimensionless):} \\ (U_t - U_e) / (U_0 - U_e) \quad (\text{Eq. 3});$$

where:  $U_t$  is the excess pore water pressure at time  $t$ , in TSF;

$U_e$  is the measured or estimated equilibrium, undisturbed pore water pressure (in situ pore water pressure before penetrometer insertion), in TSF; and

$U_0$  is the excess pore water pressure at time equal to zero, at the start of the dissipation test, in TSF

The normalized dissipation level is plotted versus log time. In uniform soils, the plot takes the shape of a reverse S-curve, beginning at one at zero time (at the instant the penetration process is stopped) and falling to zero when equilibrium pressures are achieved. Boundary effects in interbedded deposits can cause deviation from this ideal.

An estimate of the horizontal coefficient of soil consolidation can be calculated (Baligh and Levadoux, 1980) using:  $Ch \text{ (in cm}^2\text{/sec)} = (r^2 T) / t$  (Eq. 4a).

Estimates of soil hydraulic conductivity in the horizontal direction can be calculated using:

$$kh \text{ (in cm/s)} = ((r^2 T) / t) * RR * (G_w / (2.3 * S_v')) \quad (\text{Eq. 4b});$$

where:  $r$  is the penetrometer radial dimension at the plane of the piezometric filter, equal to 2.2 cm for the U2 friction sleeve filter and 1.9 cm for the U1 cone tip filter;

$T$  is a dimensionless time factor at the 50% normalized dissipation level, equal to 5.5 for the U2 friction sleeve filter and 3.8 for the U1 cone tip filter;

$t$  is the measured time, in seconds, at which the normalized dissipation level is 50%;

$RR$  is a dimensionless soil compressibility parameter;

$G_w$  is the unit weight of water, in kg/cm<sup>3</sup>; and

$S_v'$  is the effective soil vertical overburden pressure, in kg/cm<sup>2</sup>.

Dissipation test data can be presented in graphical plots and are summarized in tabular form.

## 6.0 GENERAL DATA EVALUATION

**6.1 Sounding Log** The CPT sounding logs provide high resolution information on subsurface conditions. Soil layering is often highly apparent. Soil relative strength and saturation levels can also be evaluated. Zones of anomalous soil electrical conductivity can be identified. Apparent lateral continuity of conditions can be evaluated by comparing adjacent soundings. Digital CPT data files can be used in two and three dimensional data visualization, CAD or GIS software programs.

**6.2 Soil Type Classification** Correlations between penetrometer data and soil classification have been developed from geotechnical bearing capacity theory and a relational database on adjacent CPT soundings and drilled boreholes (Douglas and Olsen, 1981). A CPT soil type chart based on cone tip resistance and friction ratio is presented in Appendix A.

The CPT tip resistance increases exponentially with soil grain size. For example, tip resistance in dense sands ranges from about 100 to 400 tons per square foot (TSF), while tip resistance in a stiff clay ranges from about 5 to 15 TSF. The friction ratio (Section 5.0) is also used for indication of soil type. The friction ratio increases with the fines content and compressibility of a soil. The friction ratio is less than about 1% in a sand and greater than about 3% in a clay. CPT soil types reflect the soil shear resistance to penetration. Soil shear resistance is not entirely controlled by grain size distribution. However, CPT soil types generally agree with classifications based on grain size distribution methods, such as the Unified Soil Classification System (USCS).

The generated pore water pressure measurement is also useful for evaluation of saturated soils. Penetration of coarse sand and gravel occurs under drained loading conditions, and thus equilibrium pressures are measured during CPTU. The pore pressure ratio (Section 5.0) is zero in high permeability soils. For saturated soils of permeability less than about  $1 \times 10^{-2}$  cm/sec, undrained loading with significant excess water pressure generation occurs during CPTU. Positive excess water pressures are generally measured during penetration of silt or clay soils when using either the U1 cone tip or U2 friction sleeve filter penetrometer (Section 2.7). Pore pressure ratios of fine grained soils typically range from about 0.4 to 1.0.

Positive excess water pressures are also usually measured in dense, silty or clayey sands when using the U1 filter penetrometer, with pore pressure ratios from about 0 to 0.3. Due to geometric effects (Section 2.7), negative pressures are usually measured in dense, silty or clayey sands, sandy silts, or hard sandy clays with the U2 filter penetrometer. Thus, it is important to note the type of piezometer filter in use. The CPTU-EC penetrometer uses a U2 friction sleeve piezometric filter.

**6.3 Potentiometric Surfaces** Equilibrium water pressures are measured during penetrometer advance in saturated, coarse sand and gravel. Measurements of equilibrium water pressures can be obtained during CPTU in lower permeability soils by pausing during penetration and allowing generated water pressures to dissipate.

**6.4 Soil Saturation** Soil saturation often can be evaluated using the CPTU sounding log. Atmospheric (zero) pressure is measured during CPTU in unsaturated soils. Hydrostatic pressures are measured in saturated, high permeability soils. Significant water pressures are generated in saturated, low permeability soils due to penetrometer advance. Decreased levels of water pressure generation can be indicative of partially saturated soils. Decreased water pressure generation also may occur in organic soils due to the high compressibility of organic soil particles and the presence of biogenic gases, such as methane and hydrogen sulfide.

**6.5 Soil Hydraulic Conductivity** Excess water pressures are generated by penetrometer advance in saturated soils with permeability of less than about  $1 \times 10^{-2}$  cm/sec. These generated pressures can be allowed to dissipate during pauses in the penetration process. The CPTU dissipation test is similar to a slug test and can be used to estimate soil hydraulic conductivity in the horizontal direction. Very high water pressures are typically generated in low permeability soils by penetrometer advance, so soil compressibility (storage) effects must be included in analyses. The CPTU tip resistance provides an index of soil compressibility for these computations.

**6.6 Soil Electrical Conductivity Behavior** Soil electrical conductivity (EC) is controlled by the conductance of both the soil particles and soil pore fluids. The ratio between pore fluid and soil-pore fluid electrical conductivity is termed the formation factor (Archie, 1942). Clays can be electrically conductive due to adsorbed water and ionic electrical charges on the clay platelets. Thus, clay EC depends on mineralogy, porosity and pore fluid characteristics. Sand grains are typically non-conductive, so granular soil conductance is primarily dependent on the conductance of pore fluids and the sand's porosity.

**Pore fluids** play a major role in sand EC. A dry sand has low EC since both the sand grains and the air in the pore space have very low conductance. Sands saturated with conductive liquids, such as brine or landfill leachates, have high EC. Hydrocarbons typically decrease EC because of their low conductance. **Soil saturation** has a pronounced effect on sand EC, as conductance increases with water saturation. Low saturation is typically associated with low EC. The low **porosity** of a dense sand results in less pore fluid available for electrical conductance and thus lower EC; the high porosity of a loose sand is often associated with higher EC. Formation factors vary as an inverse function of porosity, from about 3 at high porosity to about 4.5 at low porosity. The addition of as little as 5% clay to a sand can increase soil EC (Windle, 1977).

The high resolution of the STRATIGRAPHICS CPTU-EC electrode array makes measurements sensitive to gravel content. Two behaviors can occur when penetrating gravelly soils. One can occur when a large particle is crushed against an electrode, masking it from the pore fluids, which results in low EC values. An opposite behavior is observed in gravel deposits which contain few fine grained interstitial soils. The high resolution EC measurement can result in electrical conductance paths within the soil pore space. In this situation, high EC measurements more closely reflect pore fluid EC, rather than soil EC.

**6.7 EC Evaluation** EC data are evaluated in conjunction with CPTU-EC piezometric data and soil types for qualitative geochemical characteristics. Anomalous zones possibly indicative of contaminants can be directly sampled for quantitative chemical analysis.

**Vadose Zone** Low or zero EC values are typically measured in dry sandy soils. Increased EC in vadose zone sands may indicate moisture infiltration. Low EC data in vadose zone silty or clayey soils can be anomalous as fine grained soils often retain significant amounts of moisture within their pore spaces due to capillarity. Elevated EC values in the vadose zone may be associated with road deicing salts, buried metals and rusted metal objects, flyash and cinders, among others.

**Saturated Soils** Low EC values in saturated soils can be indicative of anomalous geochemistry. In particular, depressed EC zones immediately at the water table may be associated with floating (LNAPL) compounds. Very low EC zones at interfaces between aquifers and aquitards may be associated with either LNAPL or DNAPL compounds. Gravel interference must be considered when evaluating depressed EC zones in saturated soils.

Elevated EC values in saturated soils can be due to increased soil clay content or to increased dissolved salts in the ground water. Increased clay contents are evaluated based on the CPTU-EC piezometric data and soil type information. Zones of elevated EC immediately above an aquiclude may be associated with brines or landfill leachates (Strutynsky and others, 1998).

**6.8 UV Fluorescence Behavior** Fluorimetry (measurement of fluorescence) has been used for many years for the detection and identification of various compounds and minerals. An excitation light of short wavelength is used to expose the specimen. If fluorescent compounds or minerals are present, light of longer wavelength, as compared to the excitation wavelength, will be emitted from the specimen. This resulting light can be monitored for intensity and spectral distribution.

Compounds that fluoresce include a wide range of hydrocarbon and other organic compounds. Heavy hydrocarbons (e.g. fuel oil and coal tars) fluoresce at relatively long wavelength excitation. As excitation wavelength decreases below about 300 nm, fluorescence from lighter hydrocarbons (e.g. jet fuel and gasoline) is observed. In addition to hydrocarbons, other compounds and minerals, such as fluorites and other carbonates, also exhibit fluorescence. Compounds that fluoresce include dyes and optical brighteners, used in paints, detergents, antifreeze compounds, some food additives and cosmetics, among others. UVF response will be affected by the presence of any such compounds.

**6.9 CPT-SPT Correlation** Since most geoscientists are familiar with drilling and split spoon sampling, CPT data have been correlated with SPT blowcount N-values. The SPT N-value is defined by ASTM to be the number of blows of a 140 lb hammer, dropped 30 inches, required to drive a 2 inch outside diameter sampler 12 inches into the bottom of the borehole, after an initial seating drive of 6 inches. Correlations of CPT to the crude SPT have been based on numerical modeling of the two penetration processes and on side by side comparisons (Douglas and others, 1981). Additional details on CPT-SPT correlations are included in Appendix A.

## 7.0 GEOTECHNICAL DATA CORRELATION

CPT data have been correlated with soil type, drained friction angle, undrained shear strength, relative density and SPT blowcounts, among others. A correlation scheme including tip resistance and friction ratio has generally proved most useful for evaluating CPT data. Correlation of CPT data with other parameters has been developed using: 1) comparisons between CPT data and results of other in situ and laboratory tests in adjacent boreholes; 2) CPT testing on large scale soil samples of known composition; and 3) geotechnical bearing capacity and cavity expansion theory. Site specific information can be used to fine tune correlations. Additional information on correlation techniques, including overburden pressure normalization, test drainage conditions and recommended practices, is presented in Appendix A.

## 8.0 PROGRAM RESULTS

Acquired data are presented following the report text and consist of: 1) sounding logs with lithologic evaluation; 2) data presentation sounding logs; and 3) tabulations of correlated geotechnical parameters, including soil classifications. Digital data are presented on the attached disk, and include statistical summaries of evaluated strata for each sounding, among other data presentations. It should be noted that the computerized evaluations of soil types and other geotechnical properties were generated using a global rather than site specific data base. Use of site specific data was beyond the scope of this study.

## 9.0 STATEMENT OF LIMITATIONS

Subsurface information was gathered only at the sounding locations. Extrapolation of sounding data to develop stratigraphic continuity is conjectural. Actual site conditions between sounding locations may differ. Evaluation of soil saturation and potentiometric surfaces is only representative of conditions encountered during the field program. Seasonal variation must be expected.

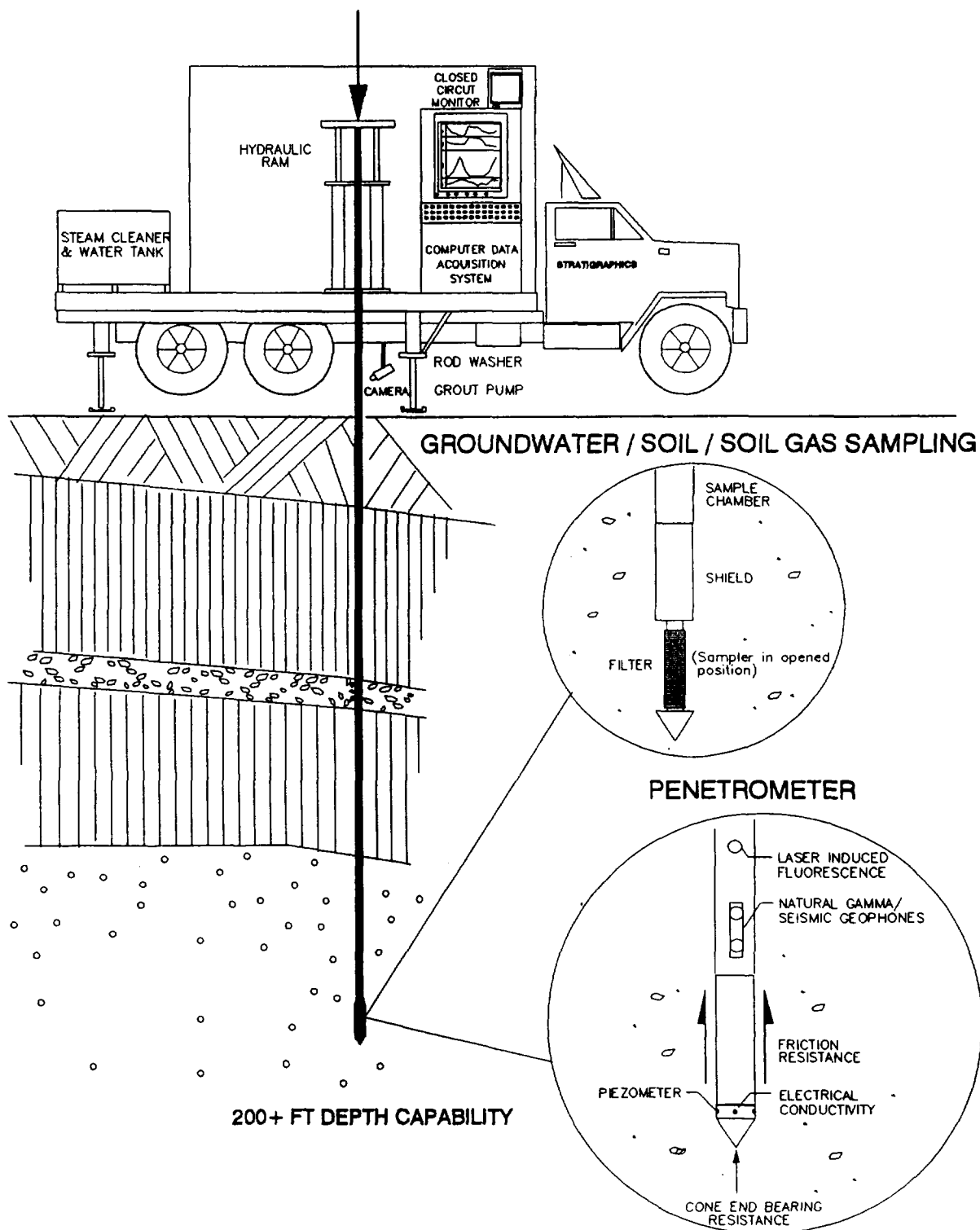
Correlation of penetrometer data with other parameters was performed using generalized, global charts rather than on site specific information. Site specific correlation work based on results of detailed, complementary laboratory testing was beyond the scope of this study.

Data gathering for this study was attempted to be performed in general accordance with accepted procedures and practices. Correlation of penetrometer data with other parameters is empirical and should not be considered as the exact equivalent of laboratory testing. STRATIGRAPHICS shall not be responsible for another's interpretation of the information obtained for this study.

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**TABLE 1**  
**SUMMARY OF CPT-EC and CPTU-EC SOUNDINGS**  
**ECC TRUST SITE**  
**ZIONSVILLE, INDIANA**

SOUNDING NUMBER	DATE PERFORMED	SOUNDING TYPE	SOUNDING DEPTH (feet)	COMMENTS
CP-001	05/21/02	CPT-EC	1.3	Shallow refusal
CP-001a	05/21/02	CPT-EC	30.1	
CP-002	05/21/02	CPT-EC	29.8	
CP-003	05/21/02	CPT-EC	30.0	
CP-004	05/21/02	CPT-EC	30.1	
CP-005	05/21/02	CPT-EC	30.1	
CP-006	05/21/02	CPT-EC	25.2	
CP-007	05/21/02	CPT-EC	25.2	
CP-008	05/21/02	CPT-EC	23.5	
CP-009	05/21/02	CPT-EC	24.2	
CP-010	05/21/02	CPT-EC	25.8	Shallow refusal
CP-010.5	05/23/02	CPT-EC	30.3	
CP-011	05/21/02	CPT-EC	26.6	
CP-012	05/21/02	CPT-EC	28.3	
CP-013	05/22/02	CPT-EC	2.2	
CP-013a	05/22/02	CPT-EC	27.5	
CP-014	05/22/02	CPT-EC	23.5	
CP-015	05/22/02	CPT-EC	26.2	
CP-016	05/22/02	CPT-EC	25.5	
CP-017	05/22/02	CPT-EC	25.7	
CP-018	05/22/02	CPT-EC	27.9	
CP-019	05/22/02	CPT-EC	28.3	
CP-020	05/22/02	CPT-EC	30.0	
CP-021	05/22/02	CPT-EC	29.6	
CP-022	05/22/02	CPT-EC	29.8	
CP-023	05/22/02	CPT-EC	28.8	
CP-024	05/22/02	CPT-EC	28.4	
CP-025	05/22/02	CPT-EC	29.5	
CP-026	05/22/02	CPT-EC	30.1	
CP-027	05/22/02	CPT-EC	22.6	
CP-028	05/22/02	CPT-EC	29.5	
CP-029	05/23/02	CPTU-EC	28.4	
CP-030	05/23/02	CPTU-EC	21.3	
CP-031	05/23/02	CPTU-EC	29.8	
CP-032	05/23/02	CPT-EC	30.7	
CP-033	05/23/02	CPT-EC	30.4	

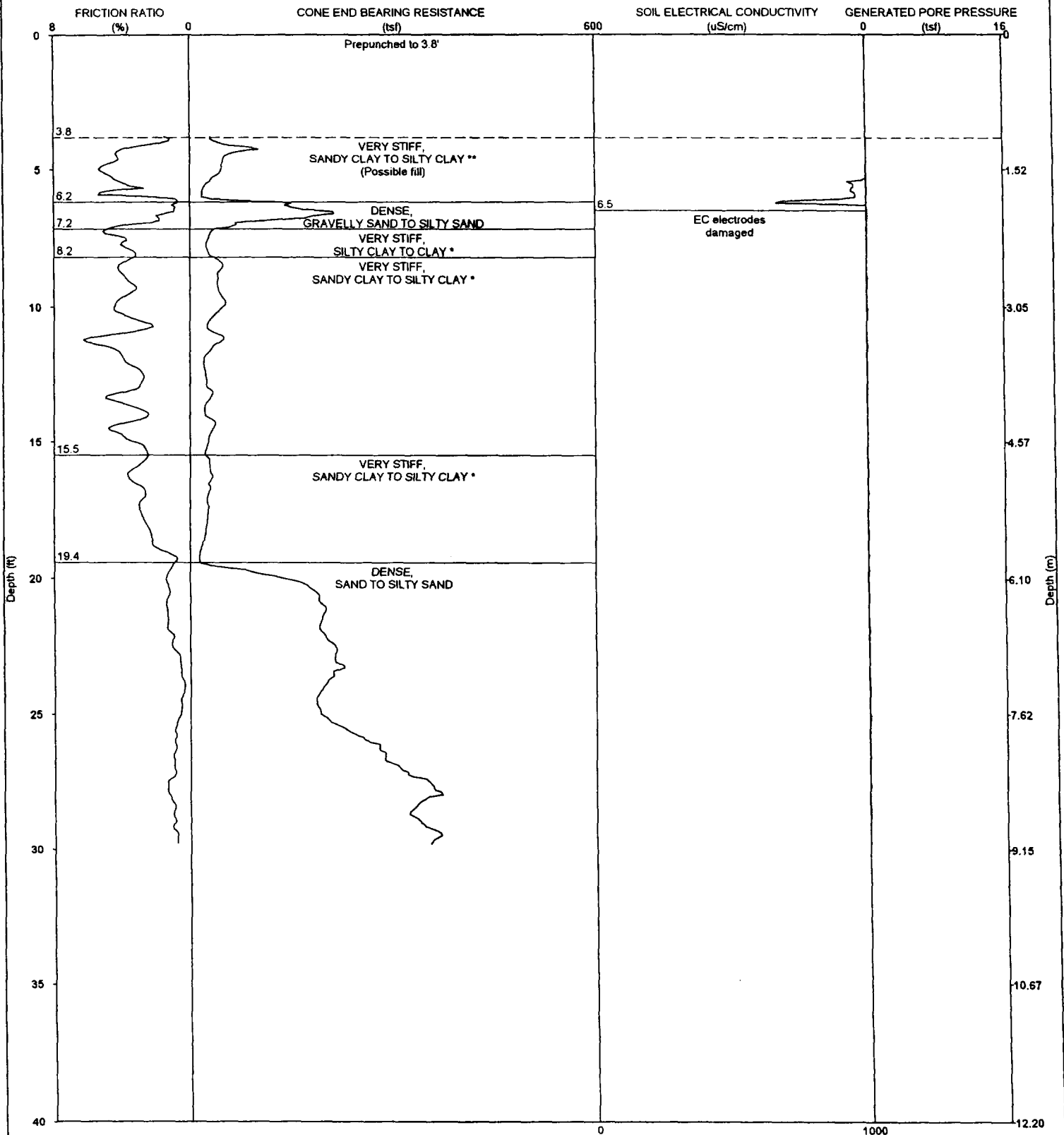
**TABLE 2**  
**SUMMARY OF CPTU-EC DISSIPATION TEST DATA**  
**ECC TRUST SITE**  
**ZIONSVILLE, INDIANA**

SOUNDING NUMBER	DEPTH (ft)	SOIL TYPE AT DISSIPATION DEPTH	t50 (sec)	ESTIMATED SOIL HORIZONTAL HYDRAULIC CONDUCTIVITY
				kh (cm/sec)
CP-029	12.6	Gravelly sandy silt	34.5	2E-04
	14.3	Gravelly sandy silt	81.5	6E-05
	15.9	Gravelly clayey sand	325	1E-05

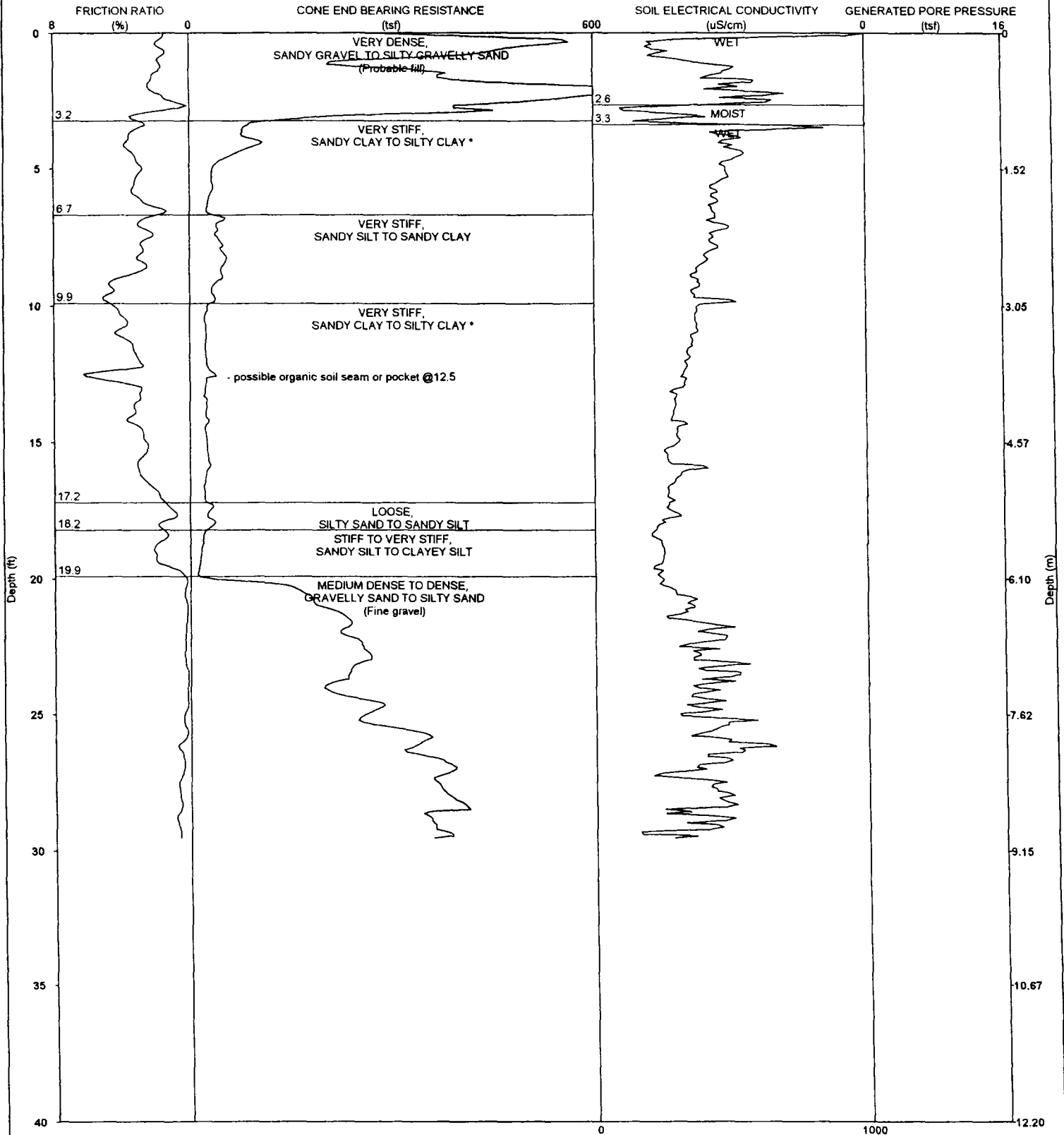
NOTE: All dissipation tests must be performed in lower hydraulic conductivity (less than about 1E-2 cm/s) soil layers and strata, as CPTU-EC generated soil pore water pressures in more conductive soils dissipate faster than the response time of the sensors and data acquisition system. As such, this summary of test results is necessarily biased towards lower conductivity layers at the Site, and must not be considered as representative of the entire soil profile. Inspection of the continuous CPTU-EC sounding logs will indicate the relative frequency of lower and higher hydraulic conductivity soil layers at the Site.

\*1. Estimates of the vertical coefficient of consolidation, in the normally consolidated range, can be estimated using:  
 $C_v(nc) = RR(\text{probe}) / CR * (k_v / k_h) * Ch(oc)$  from Baligh and Levadoux, 1980 (see Appendix B of this report)

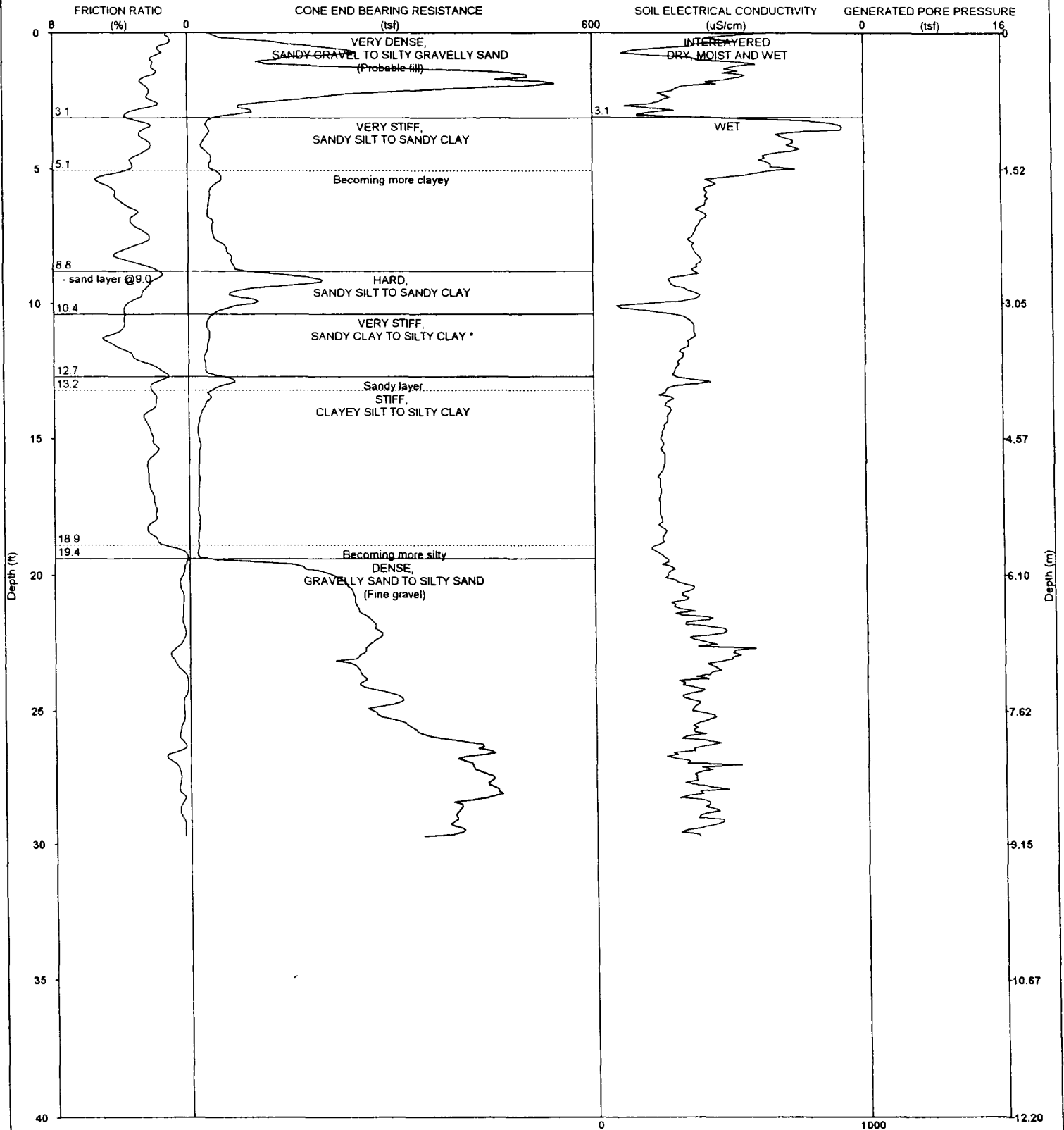
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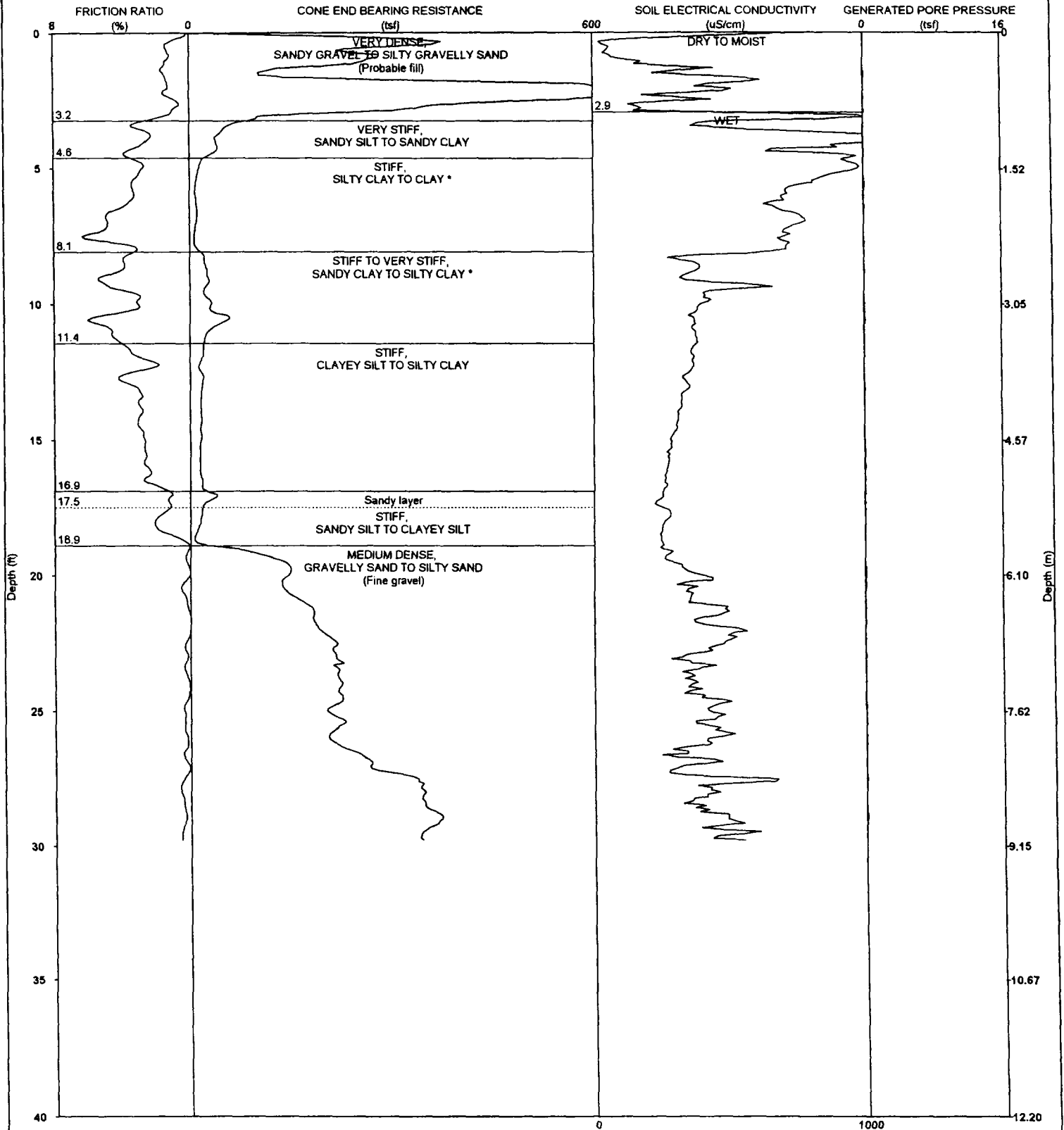
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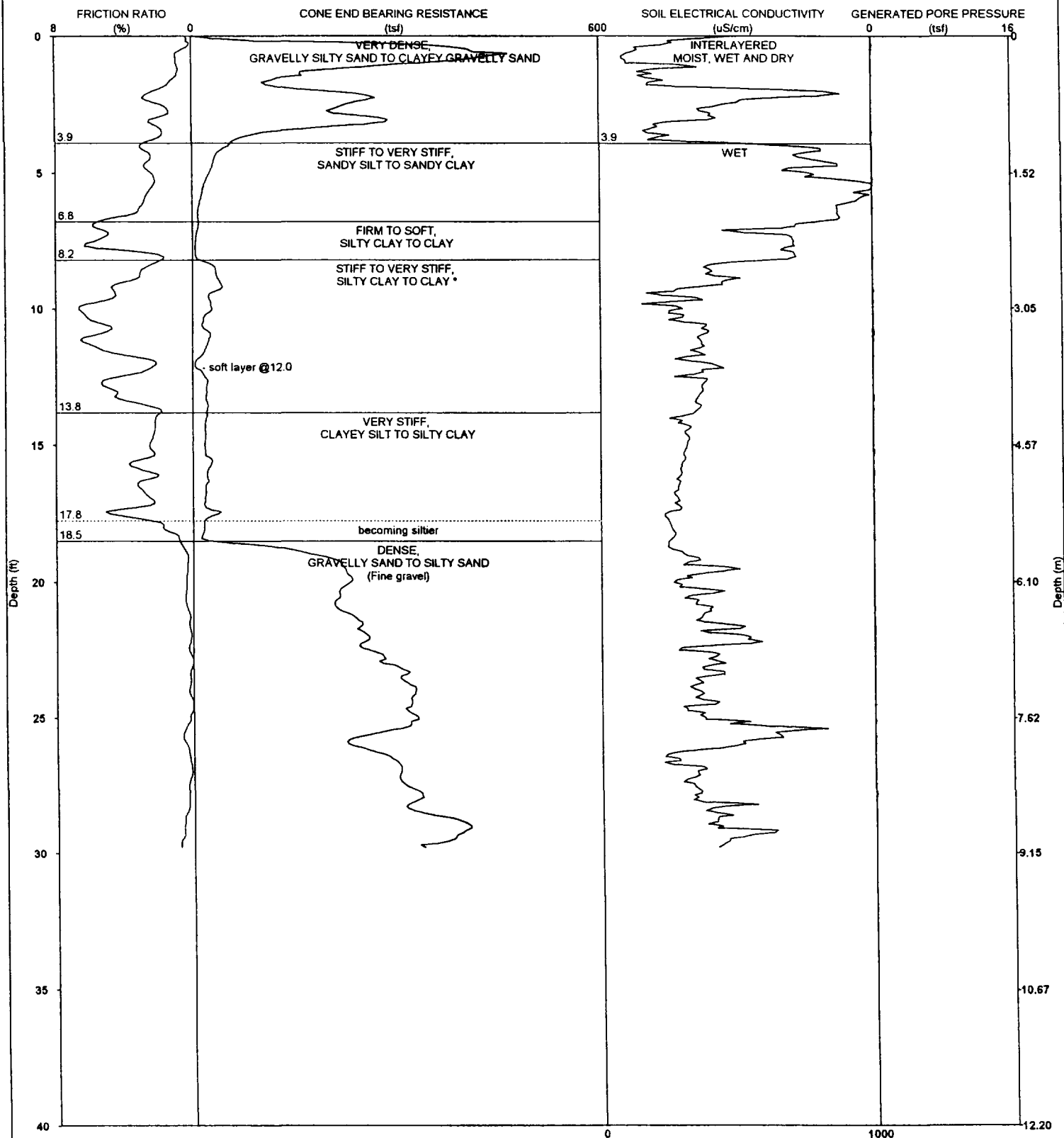
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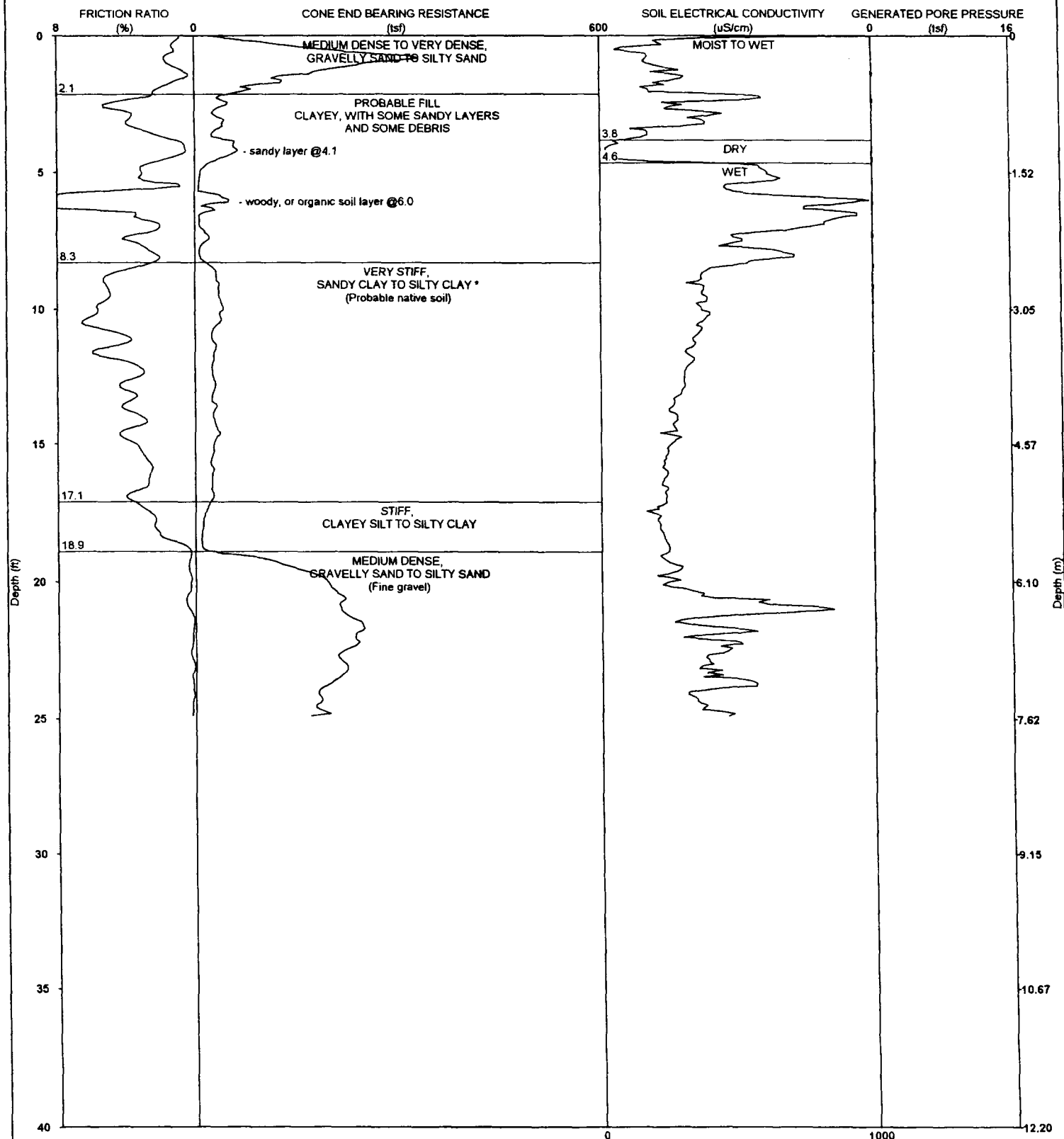
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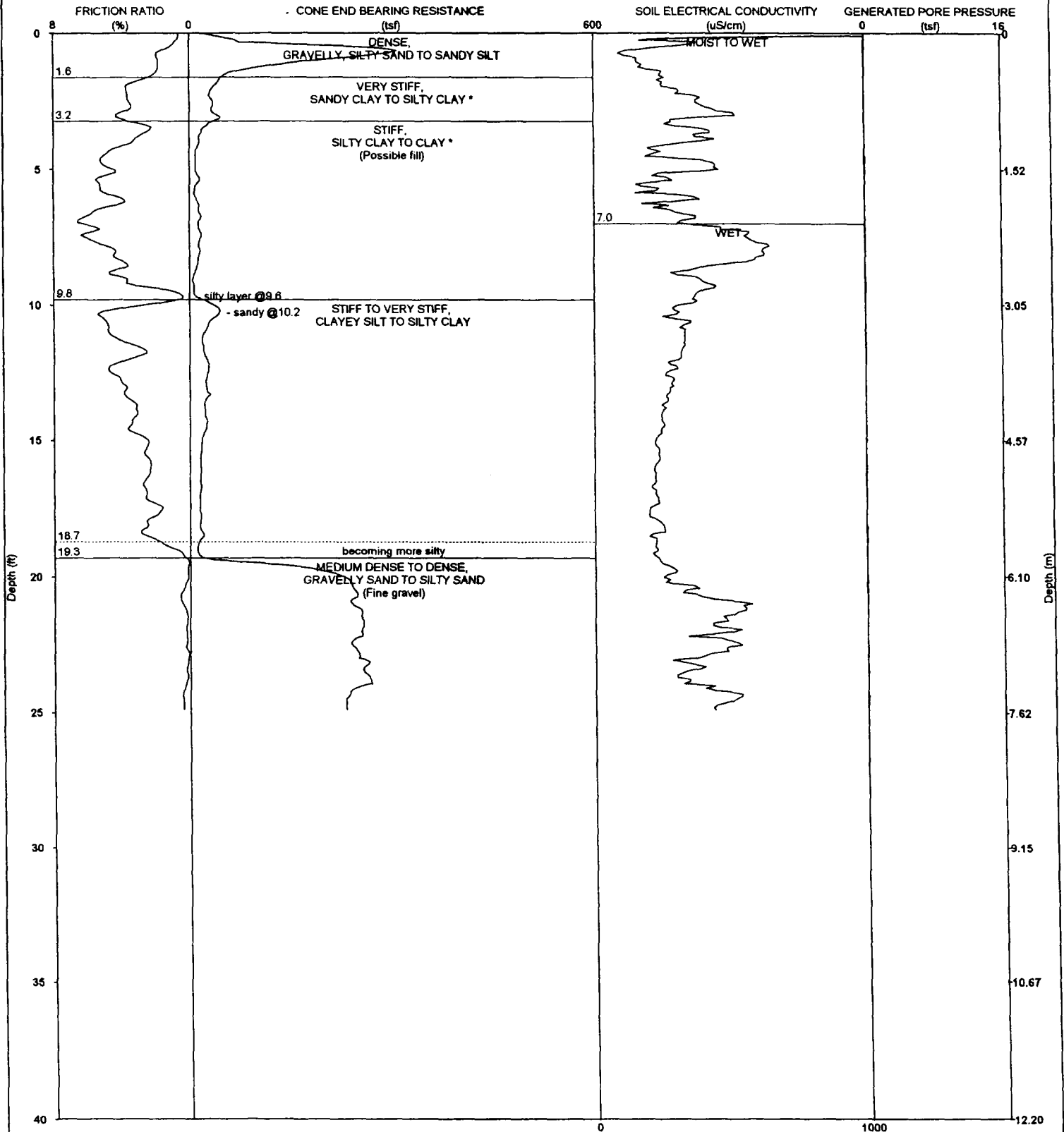


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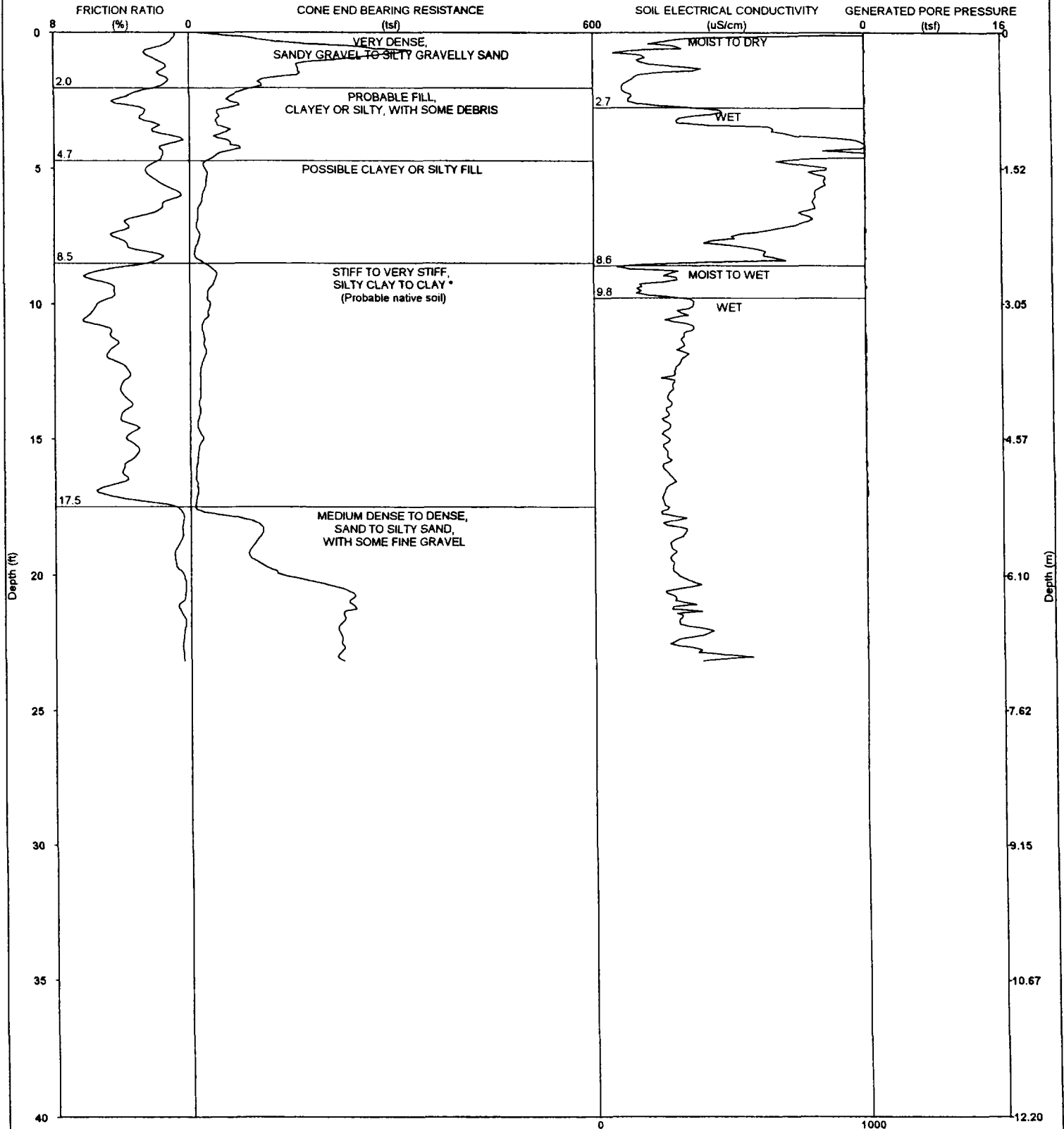




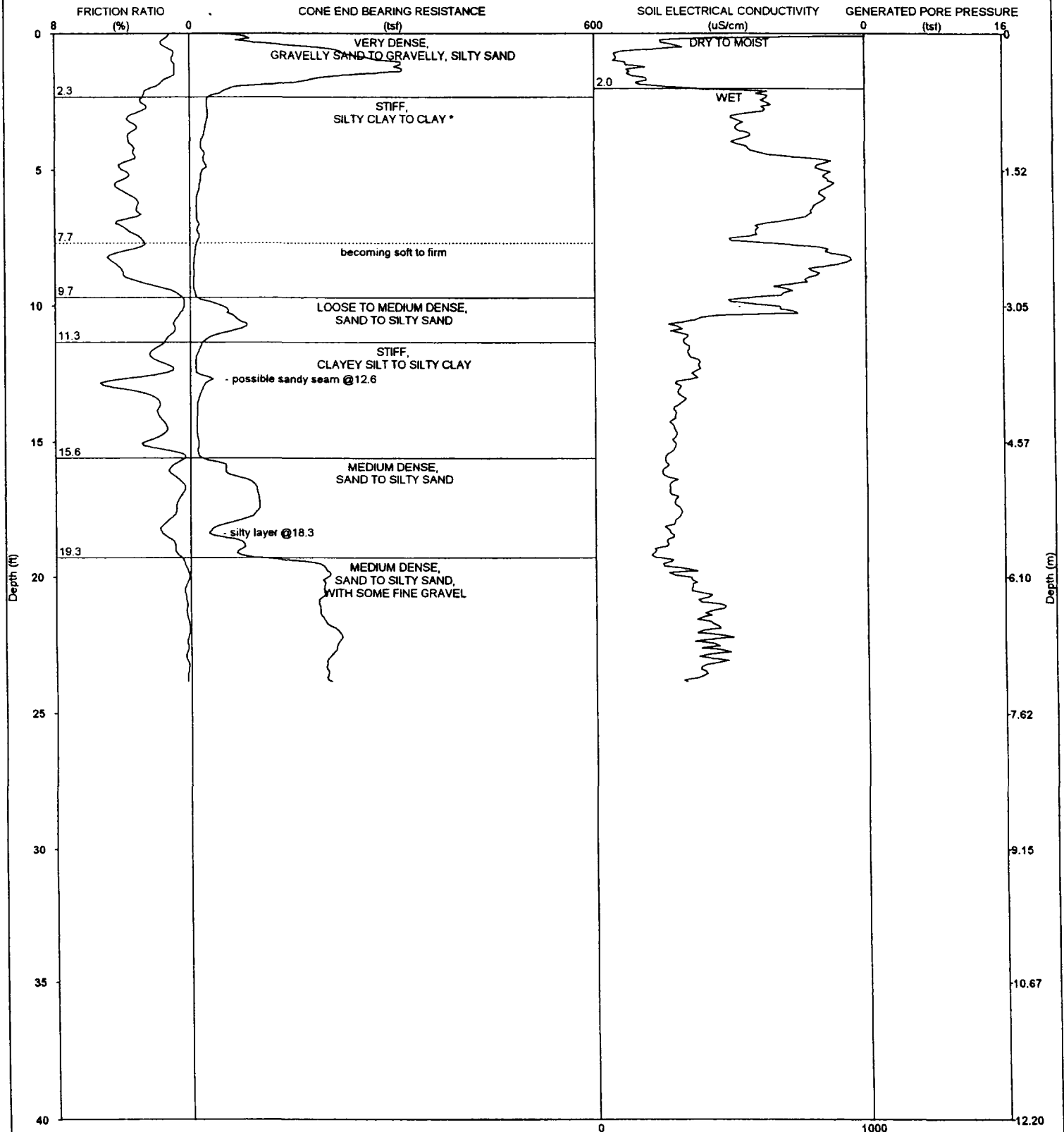
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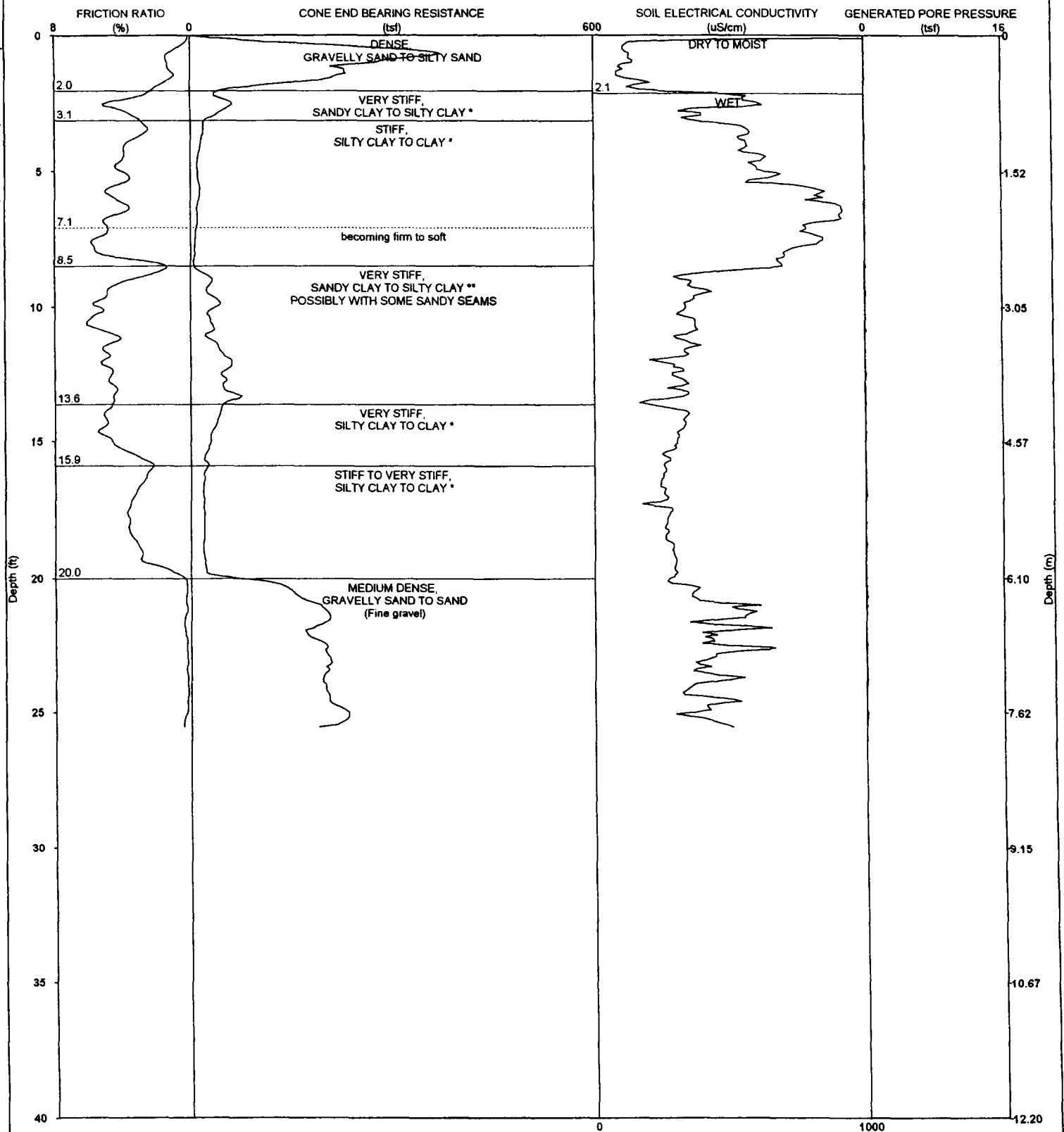
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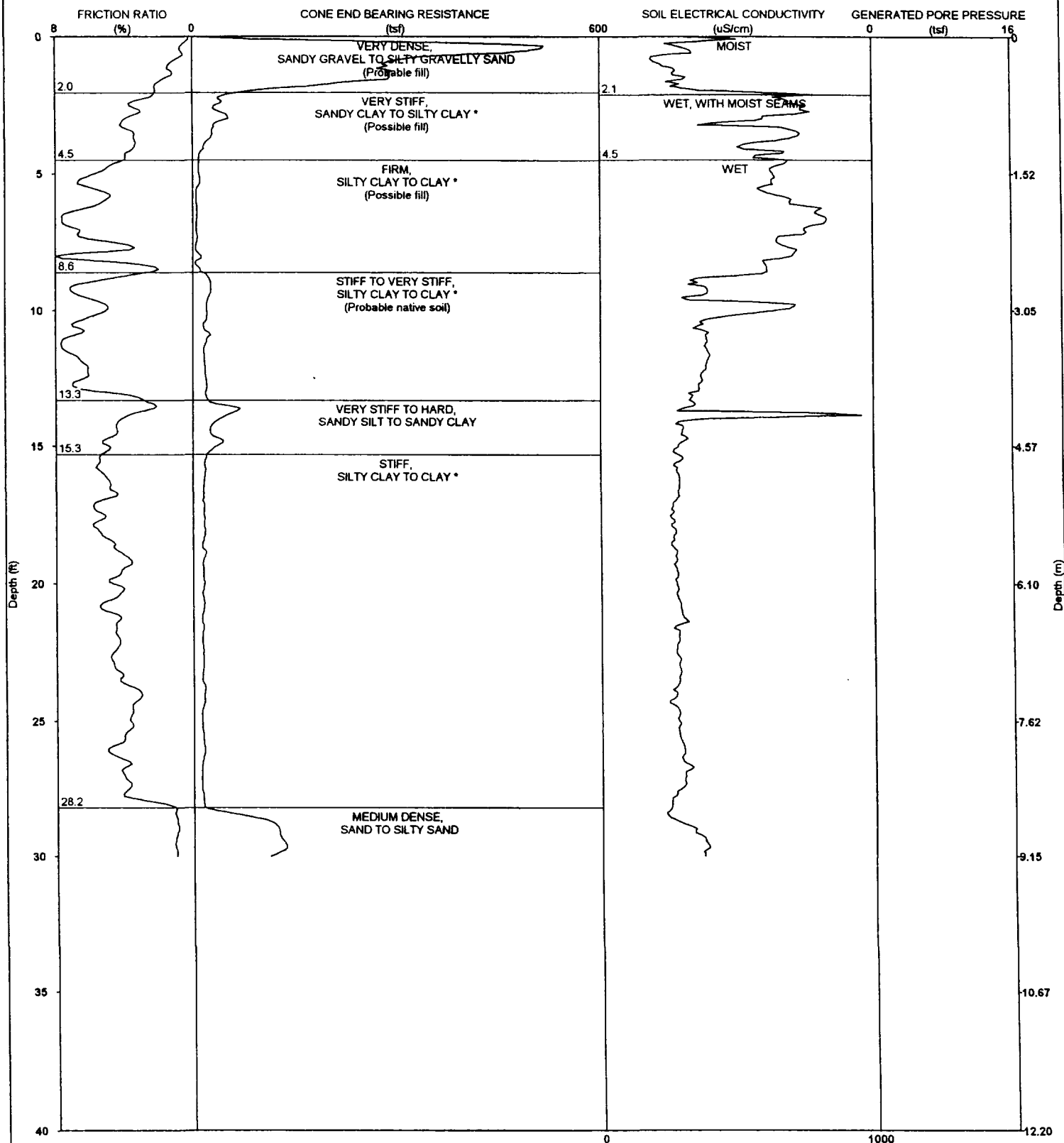
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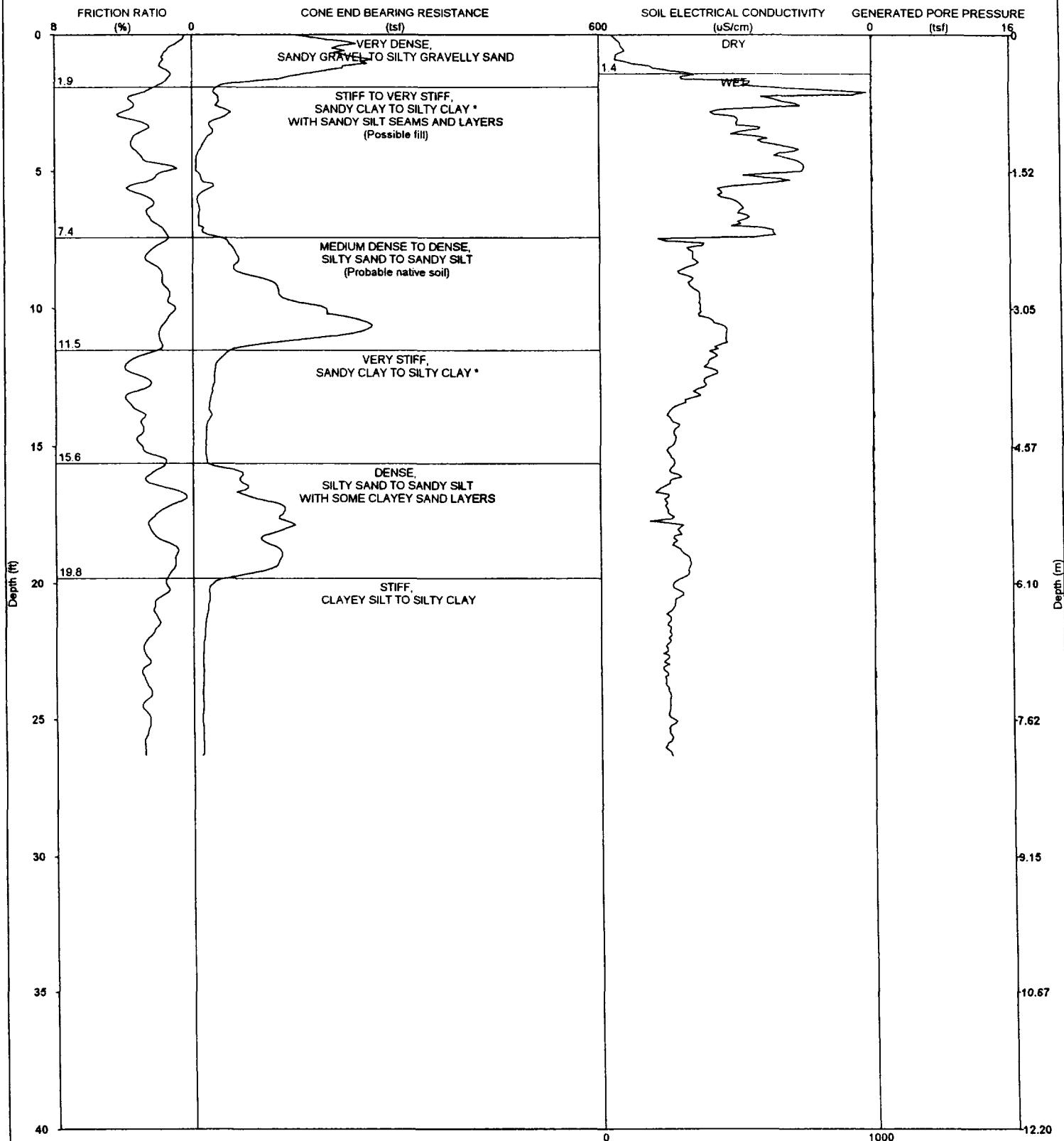
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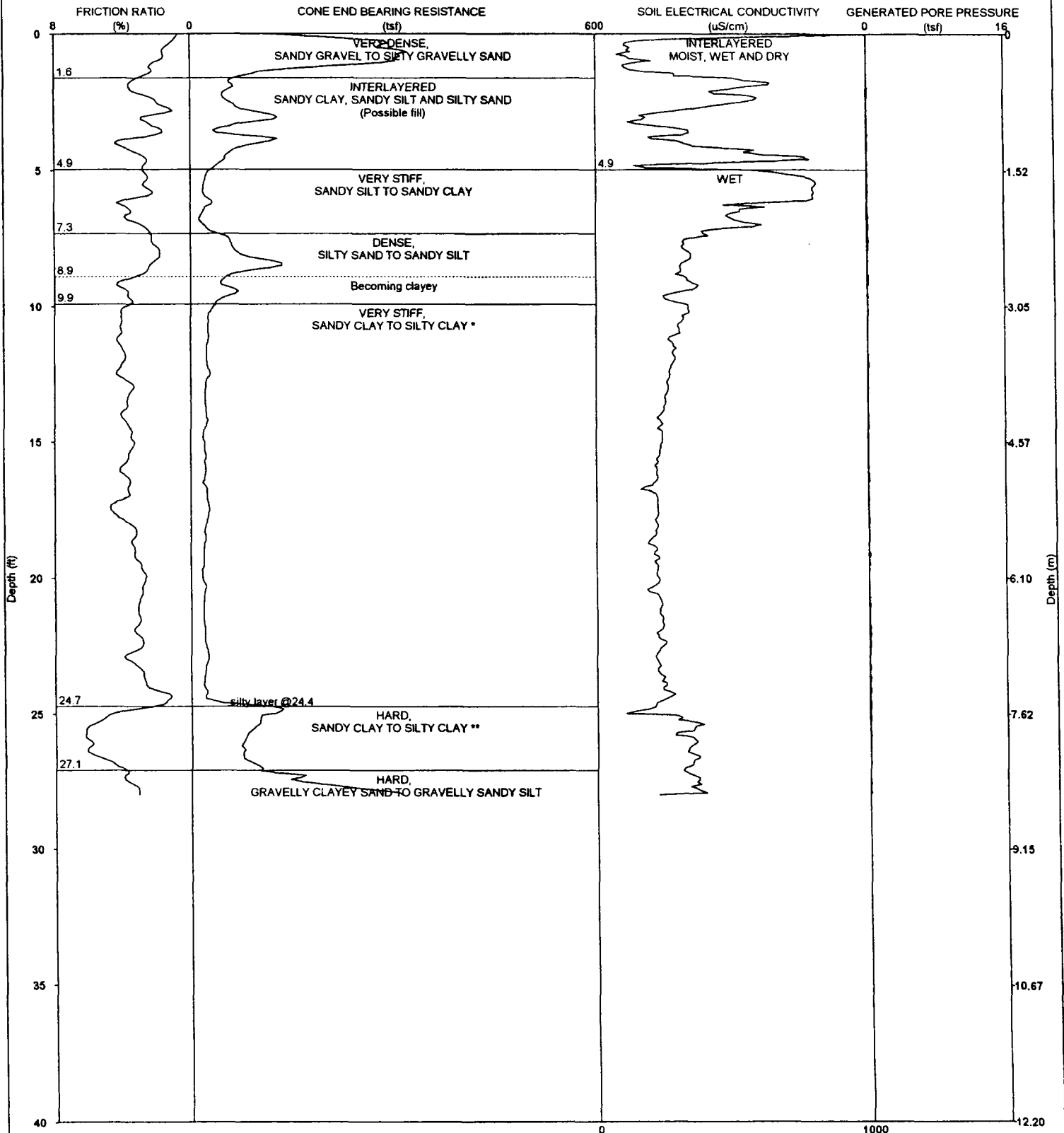
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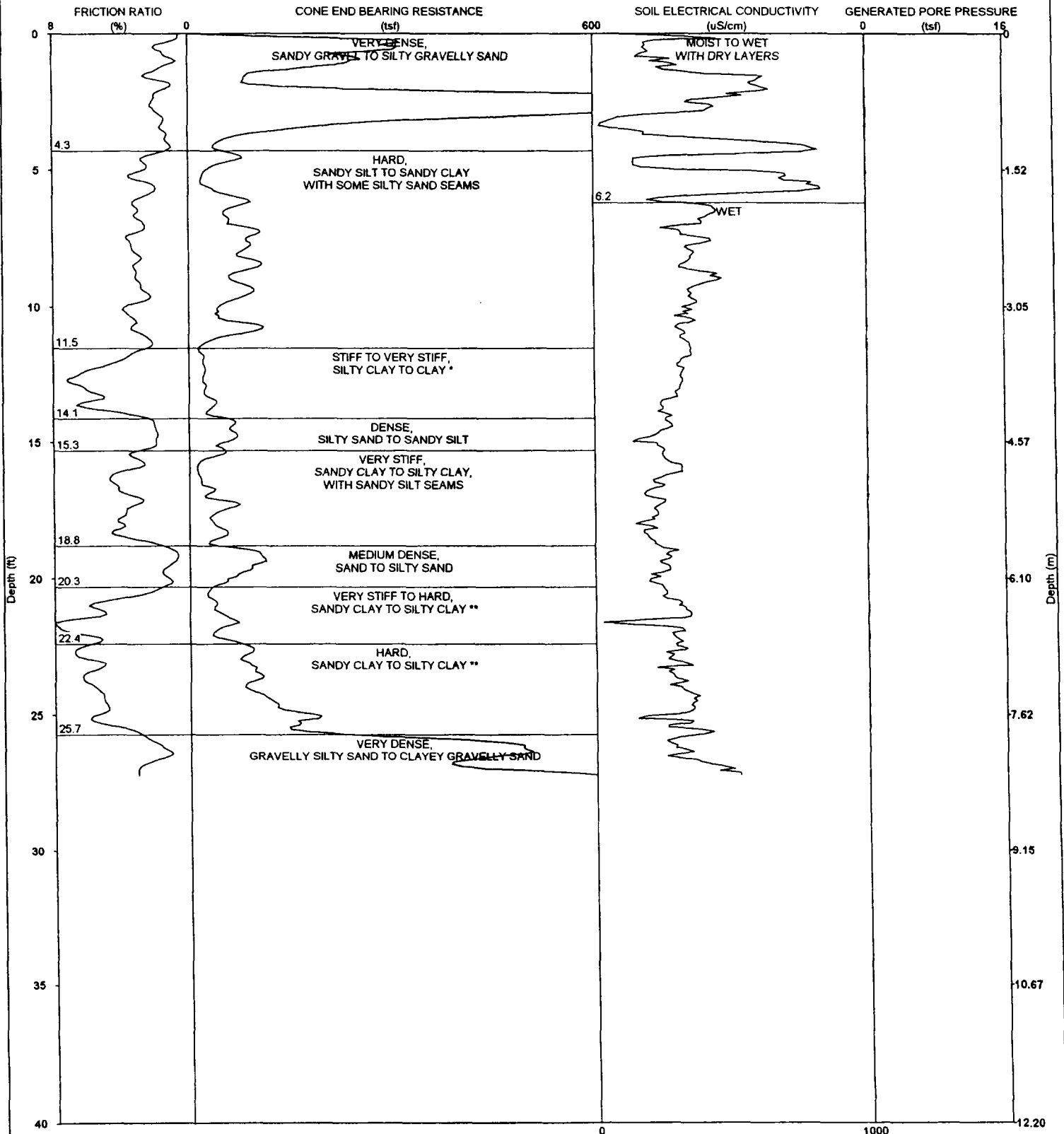
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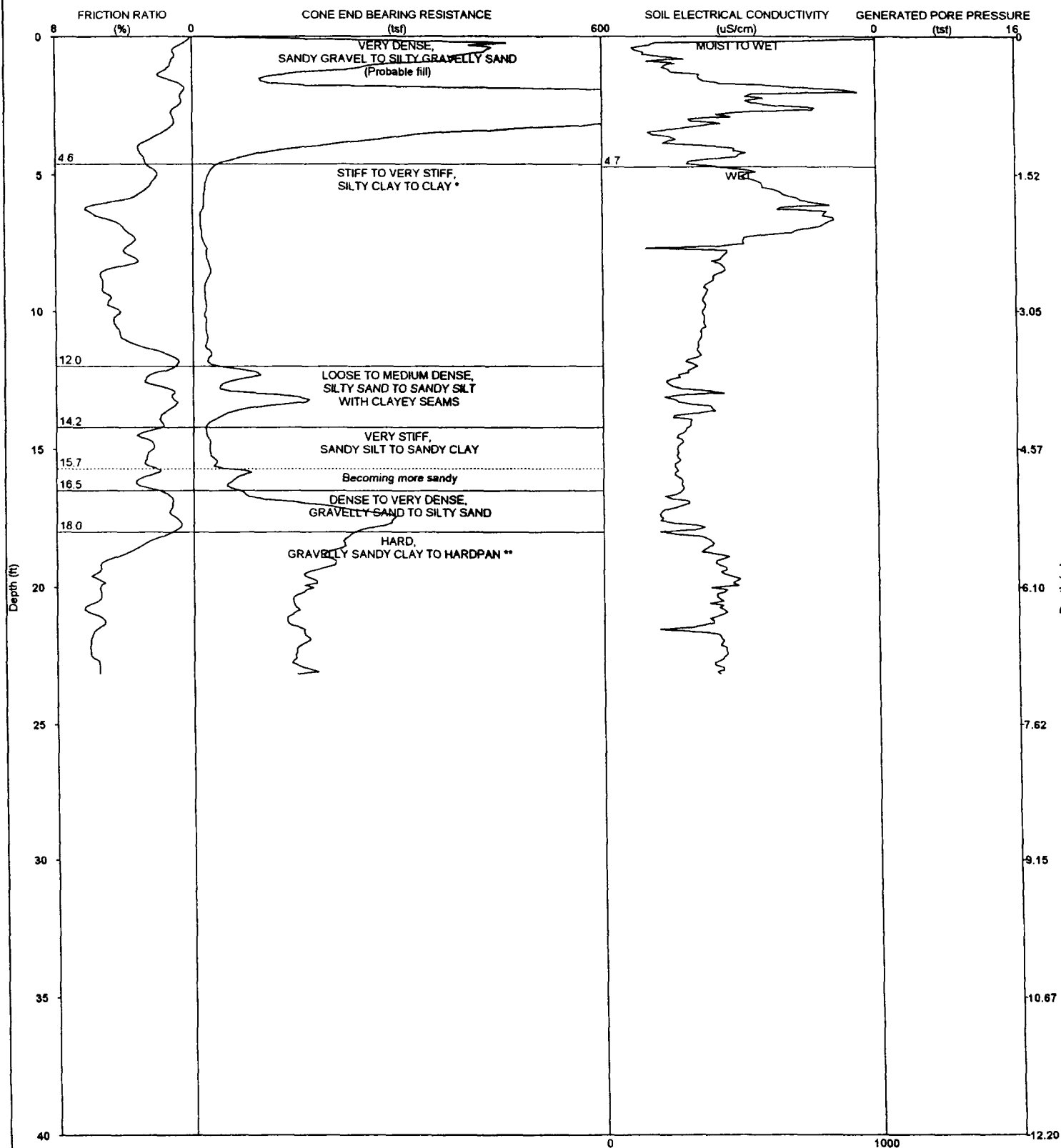


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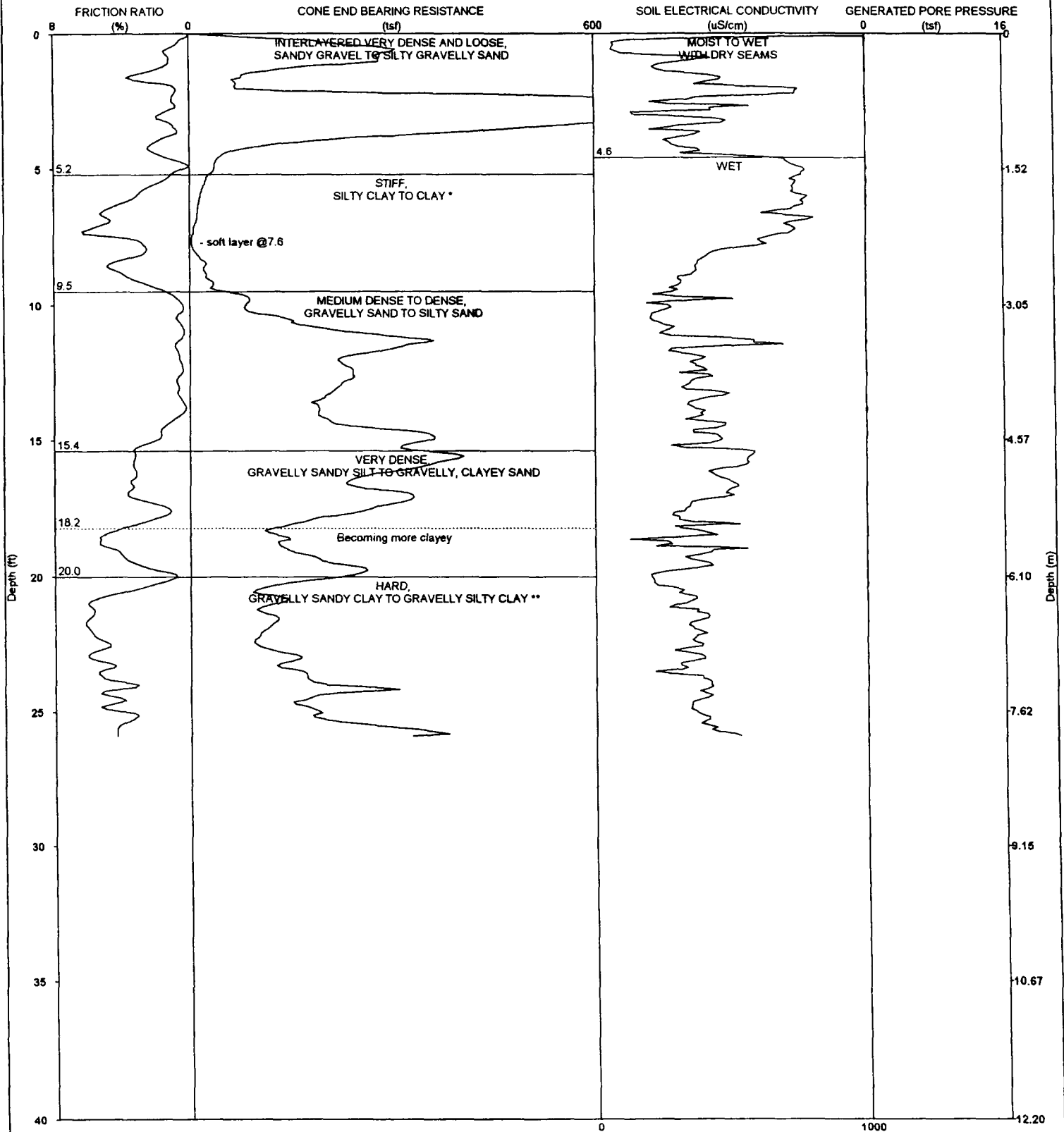




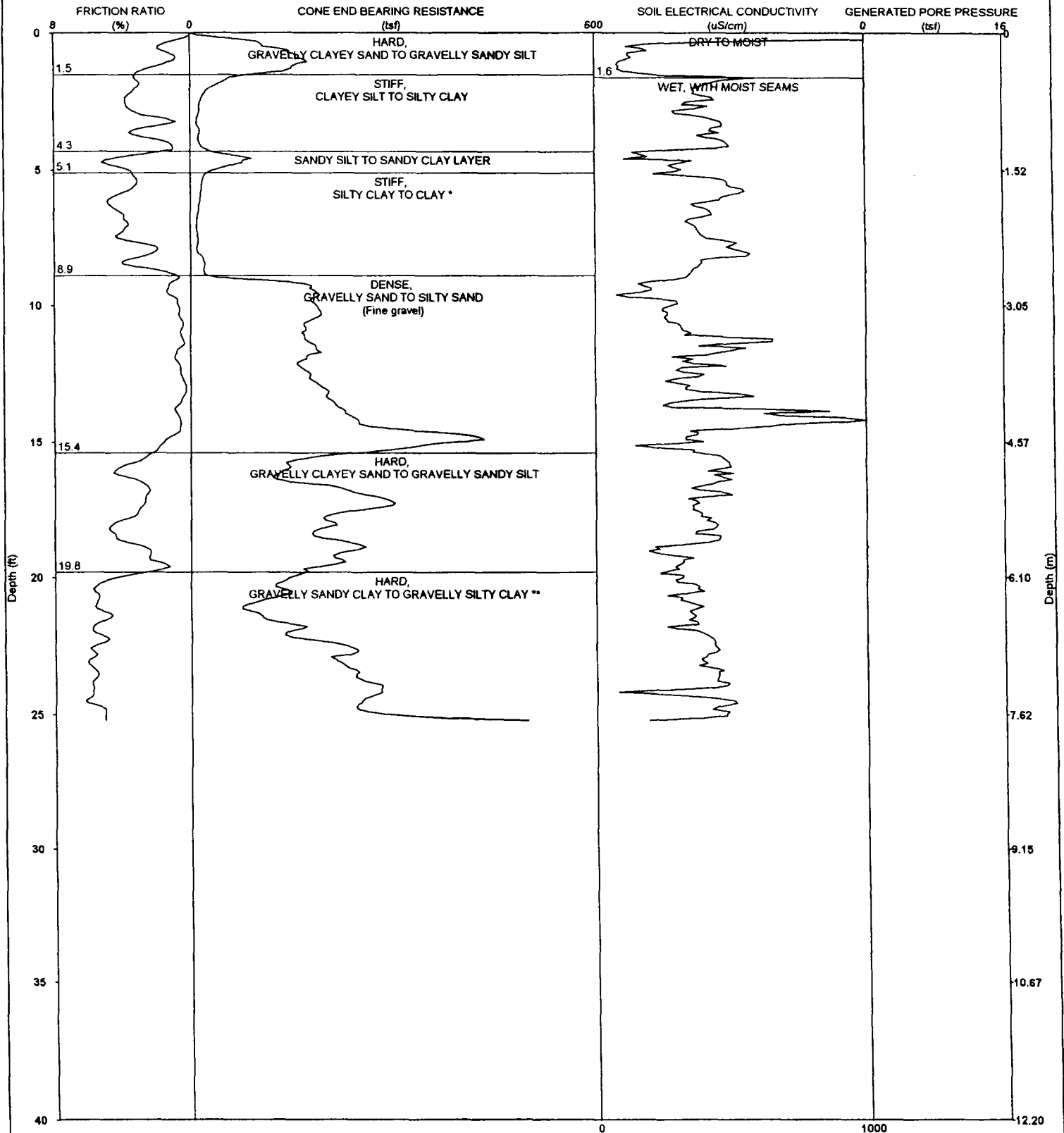
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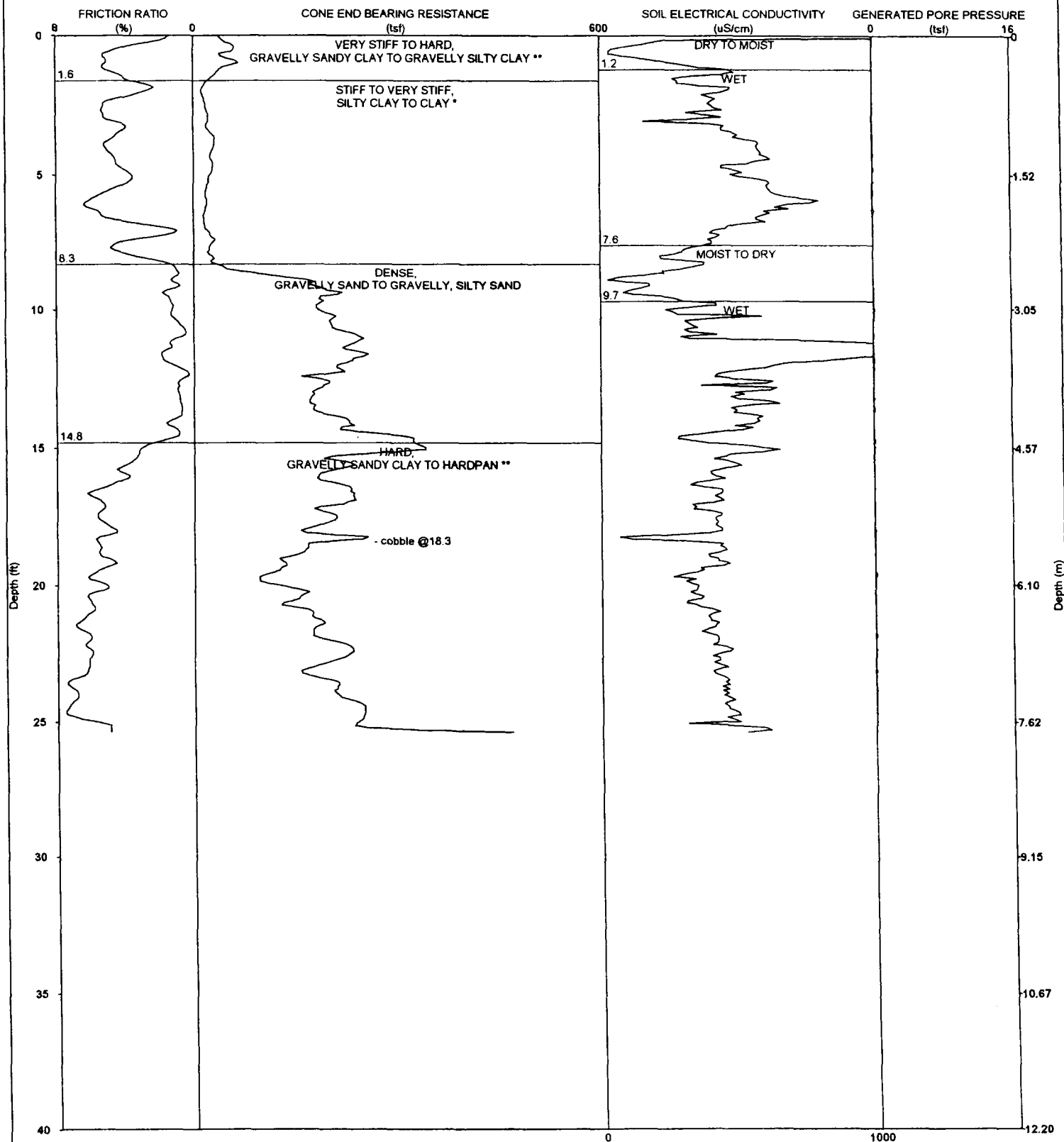
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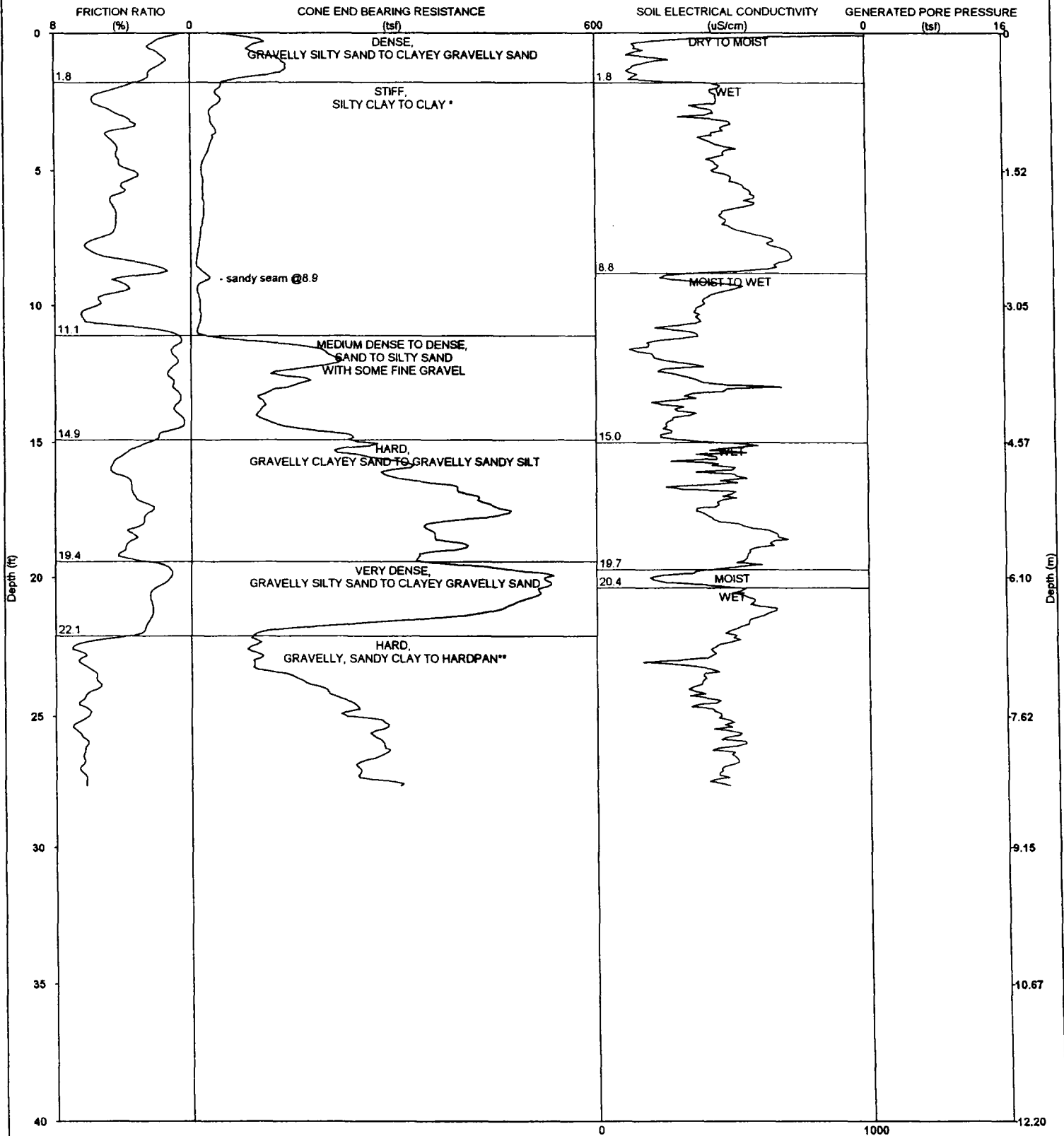
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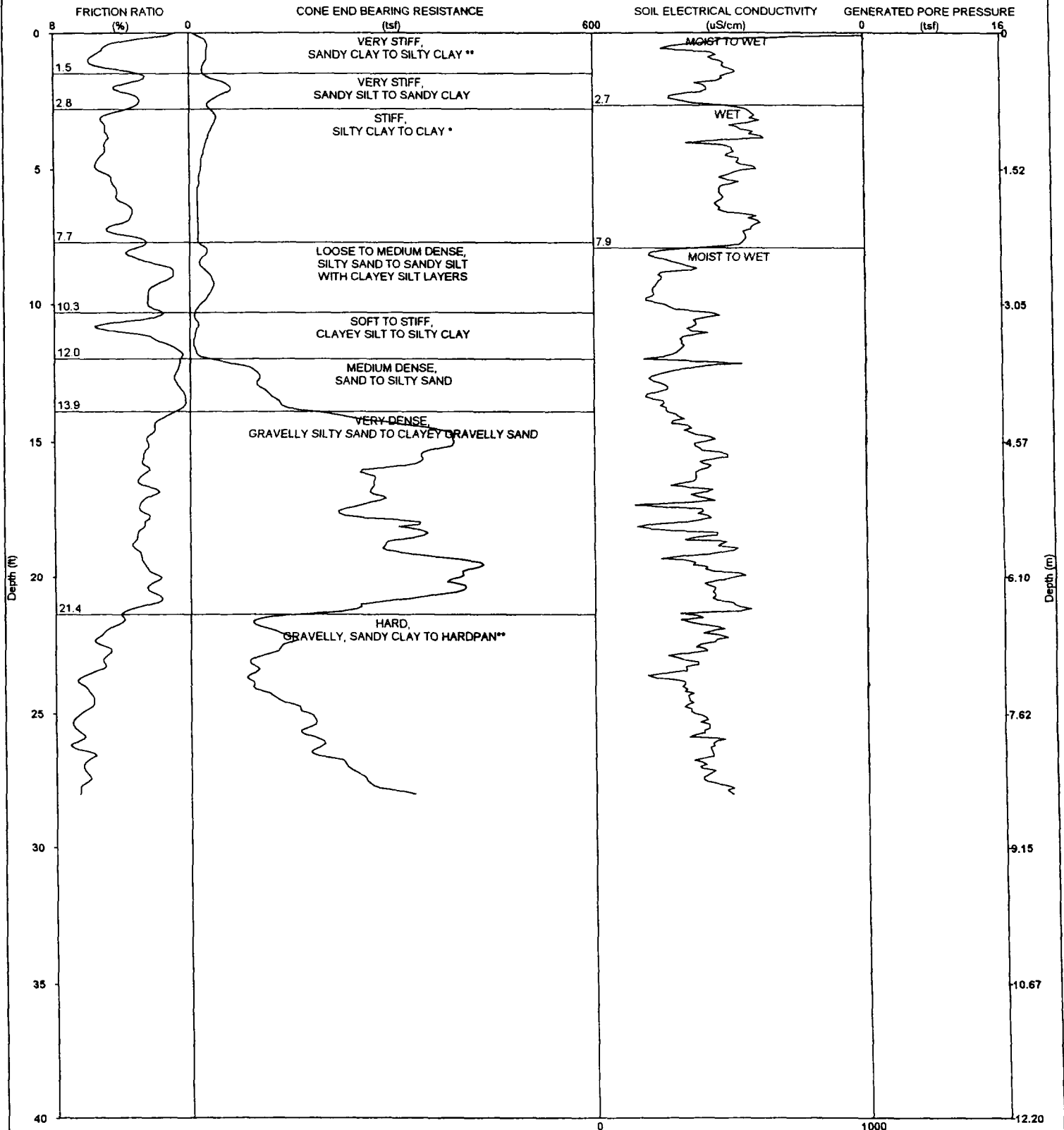
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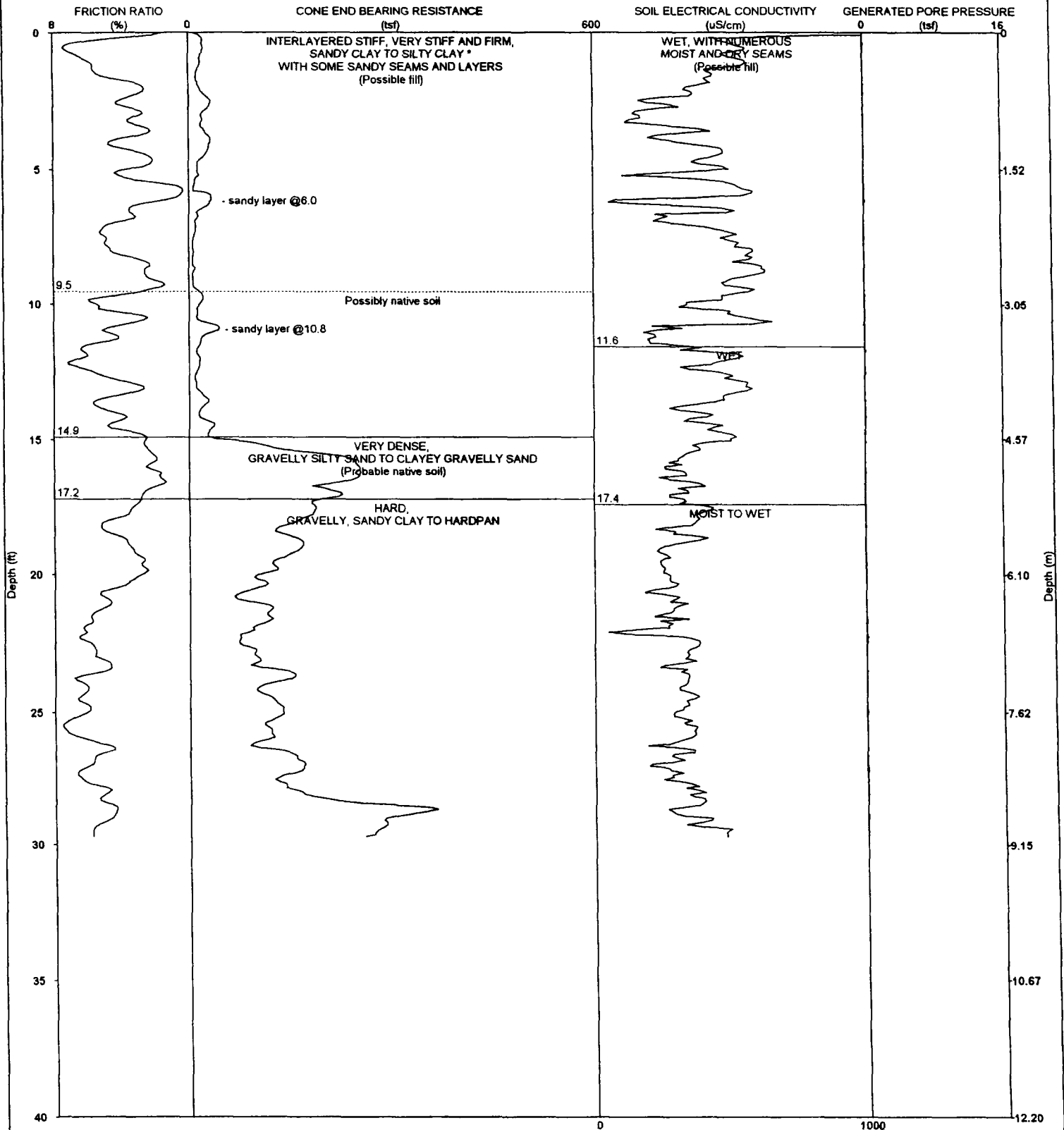
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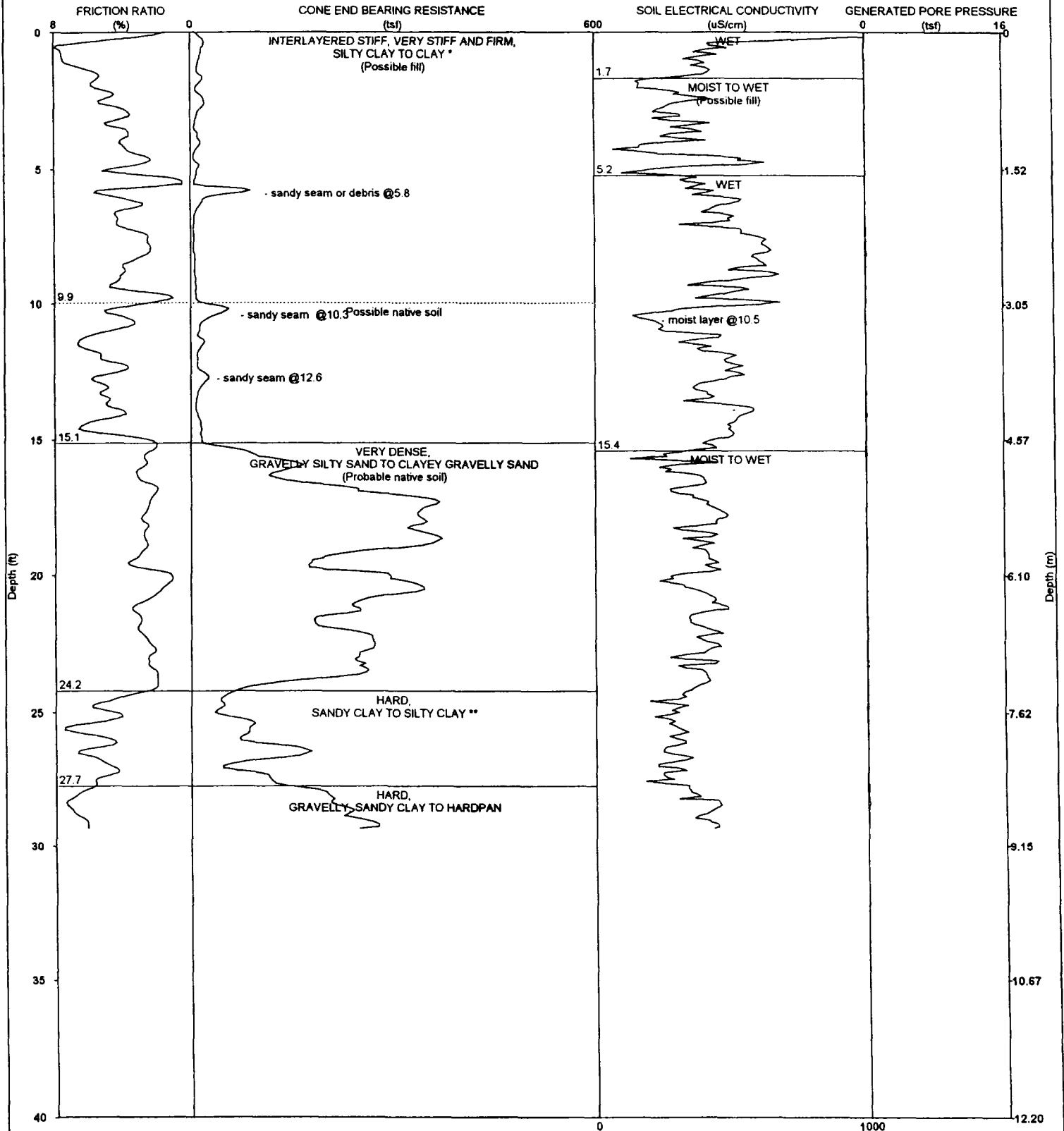
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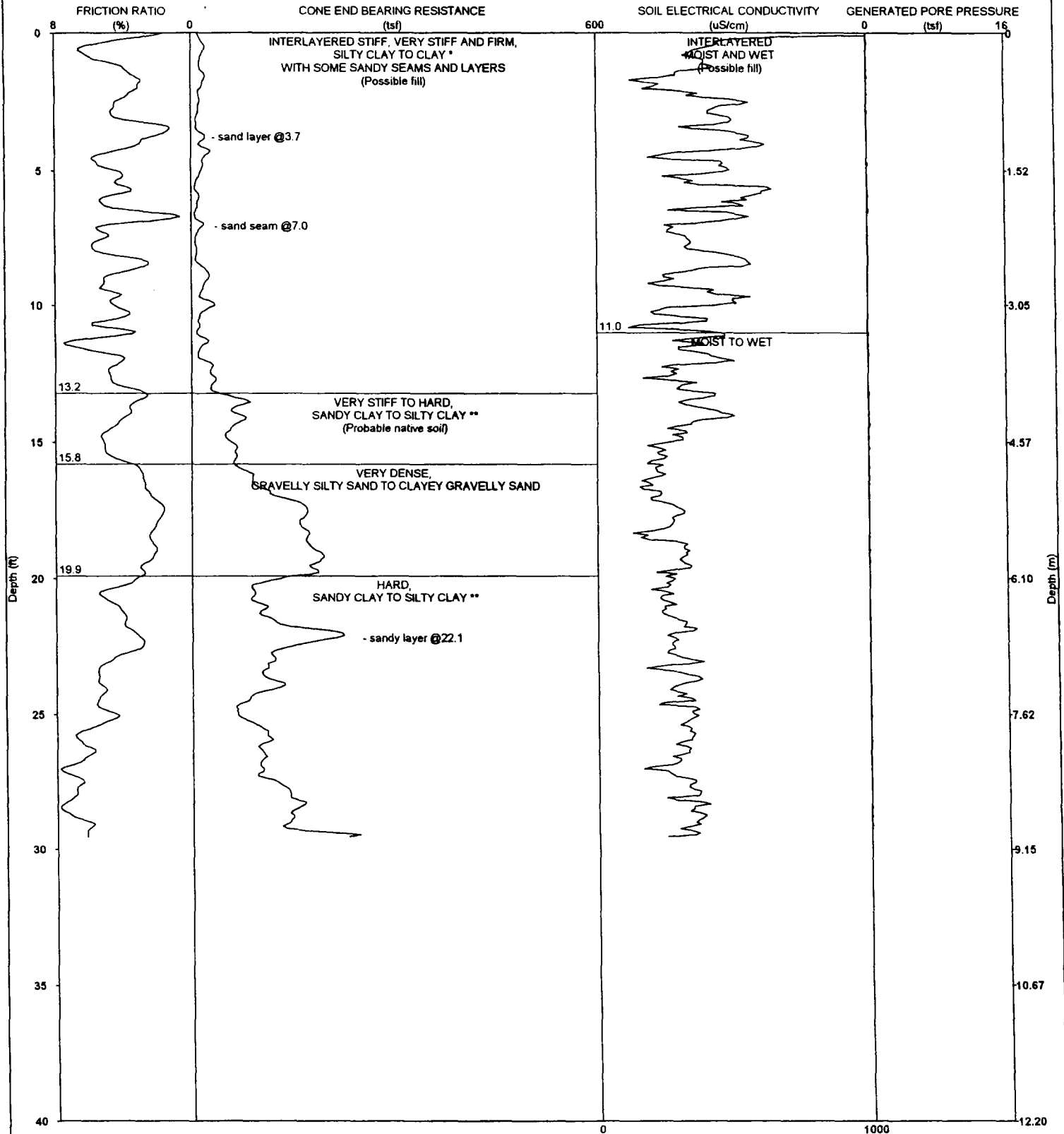


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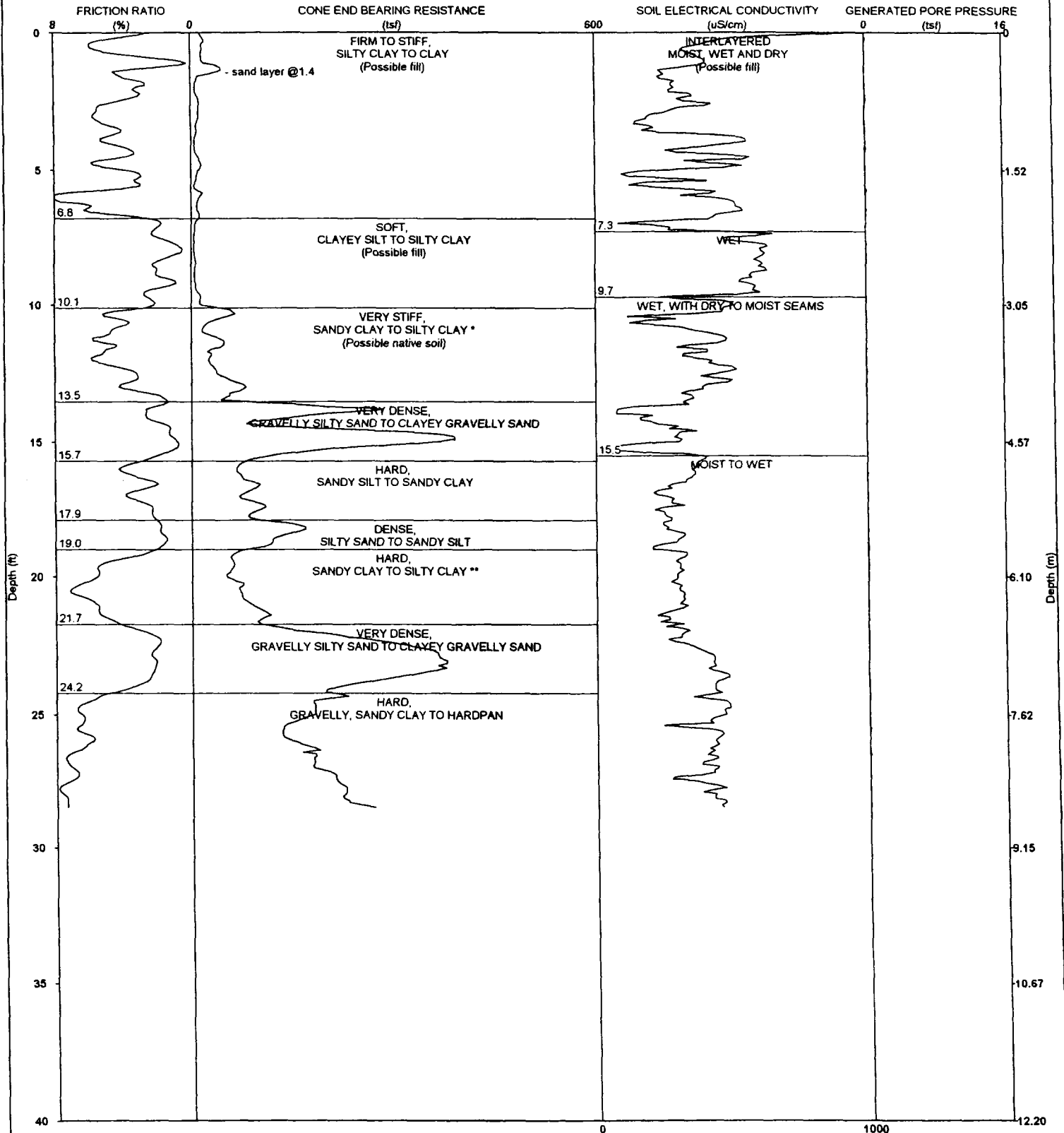




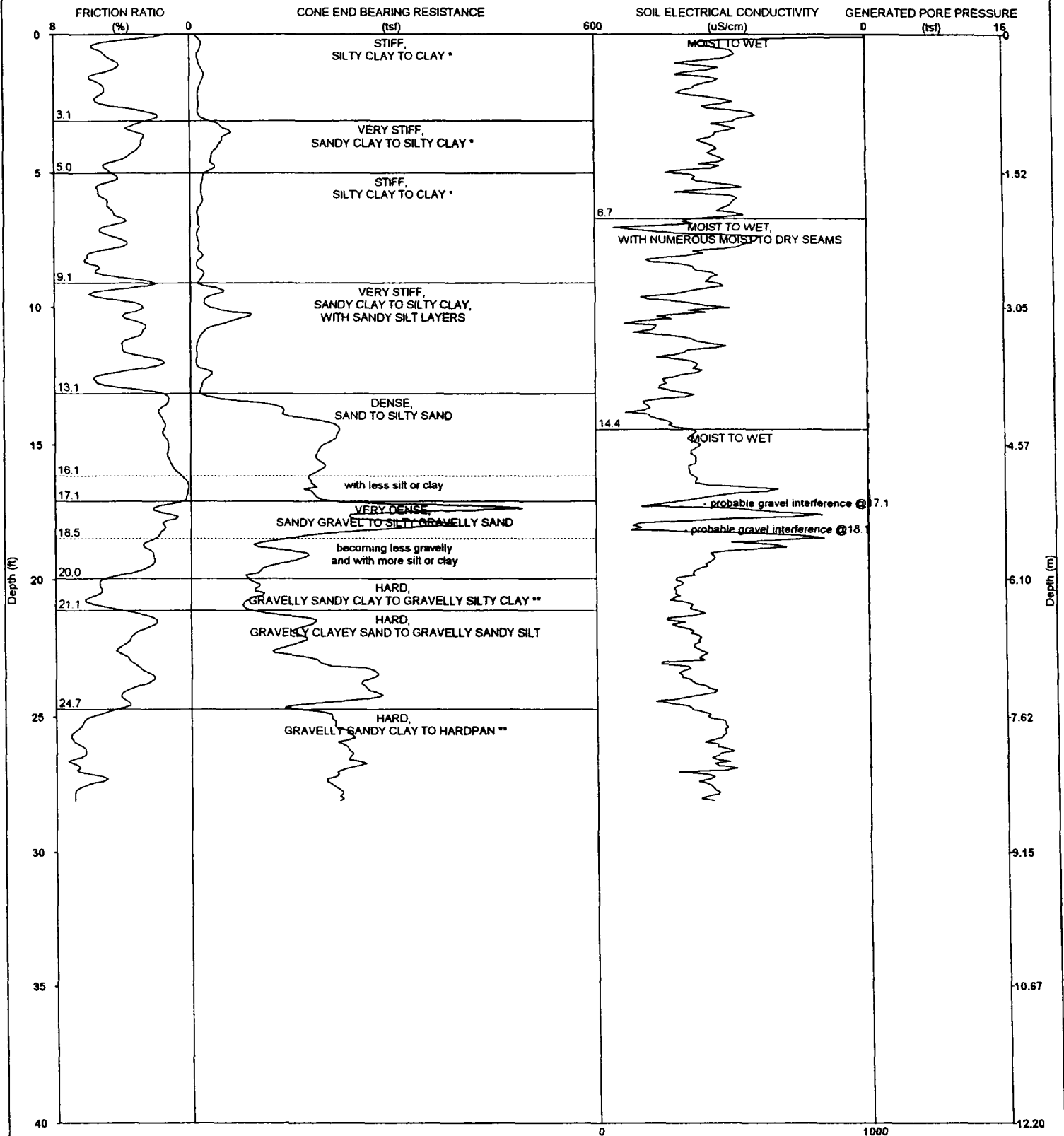
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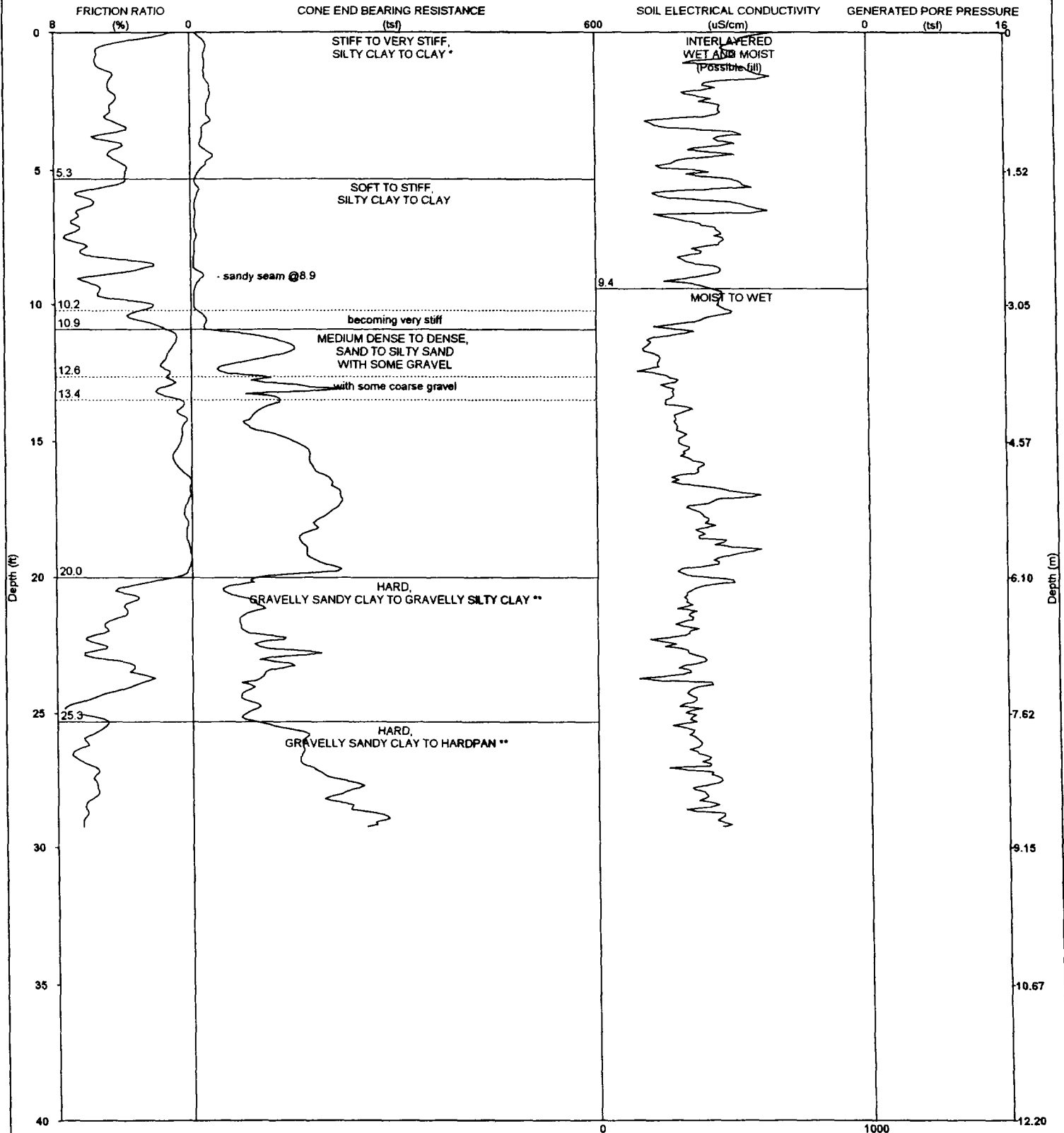
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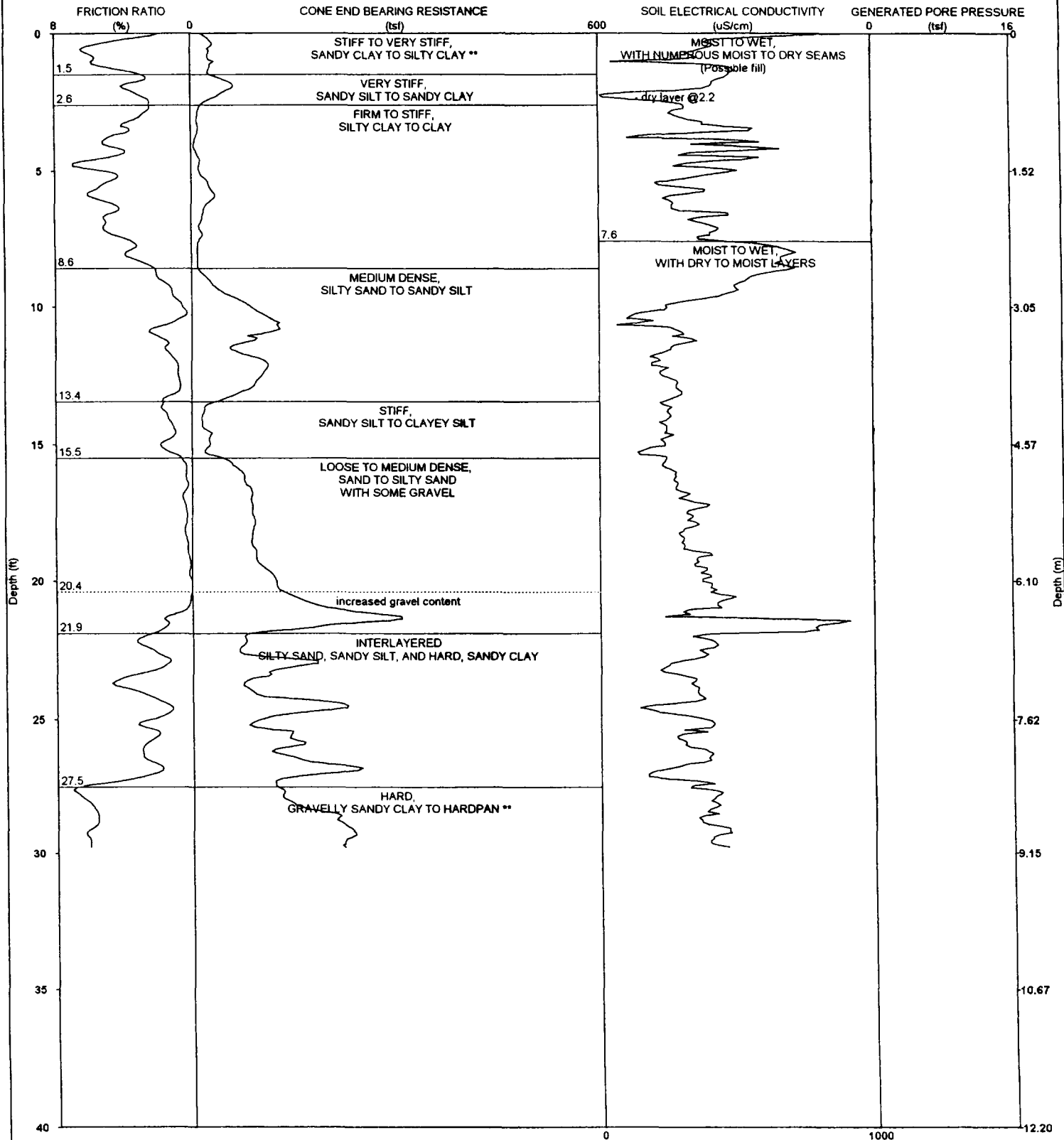
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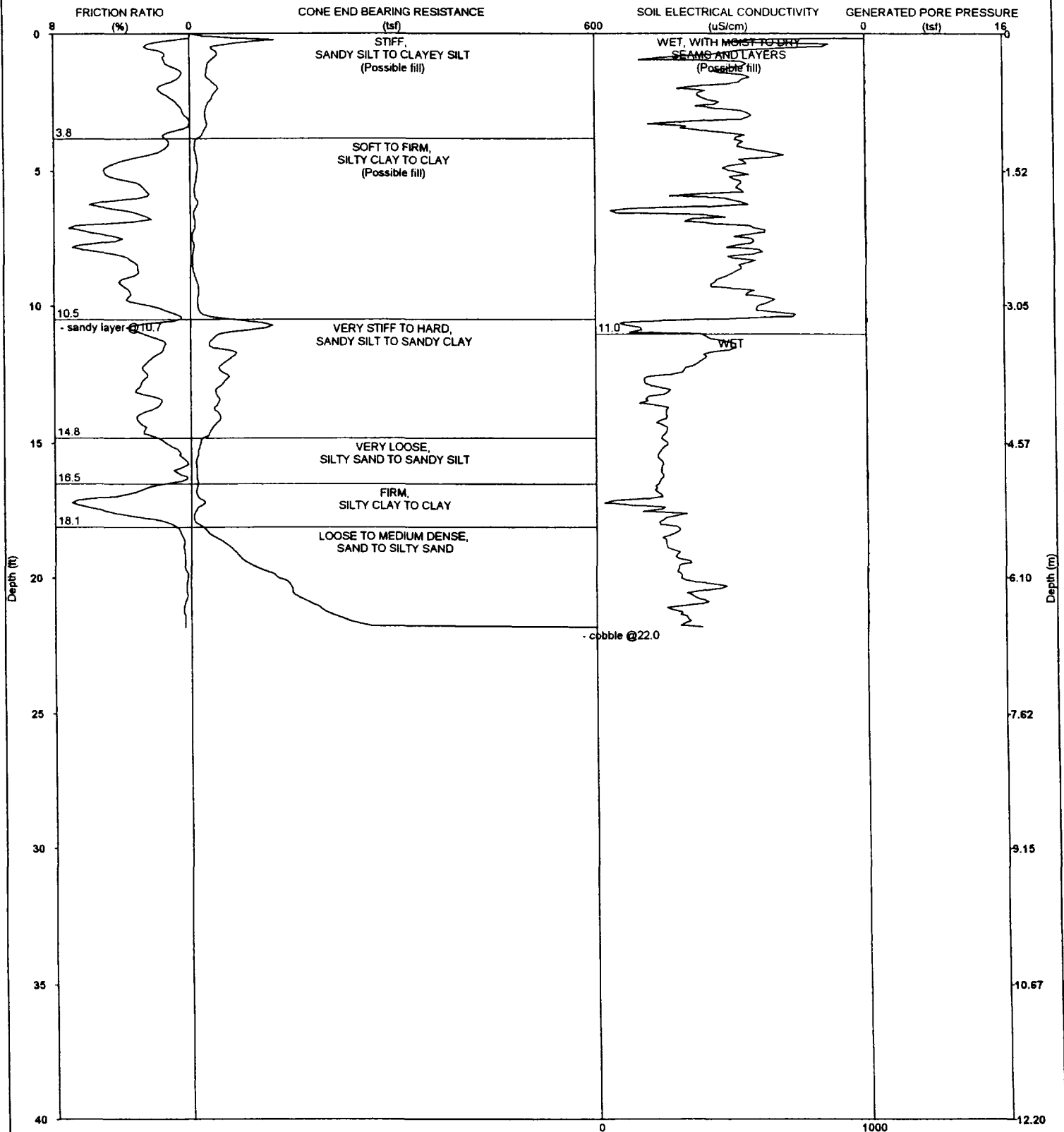
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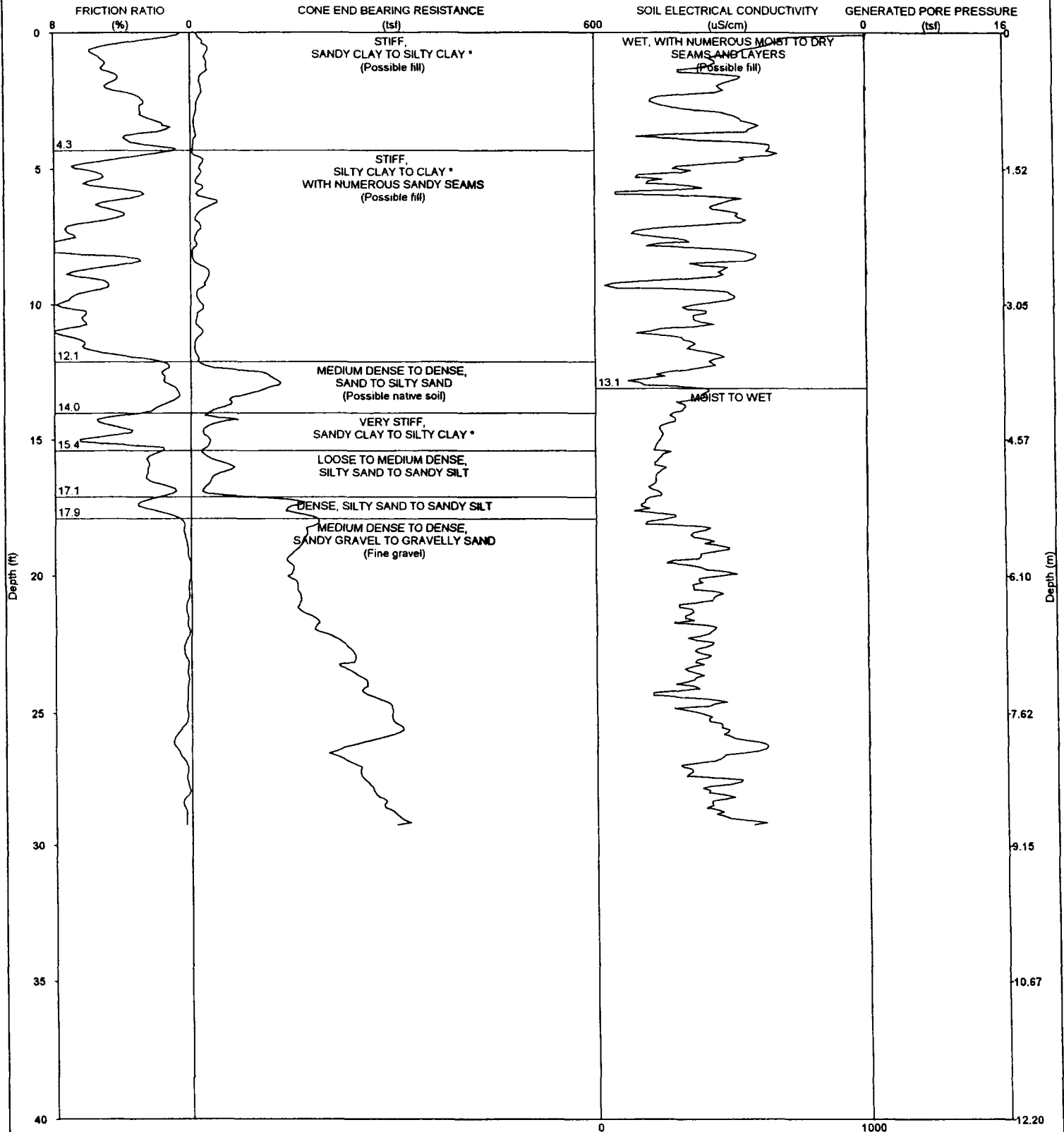
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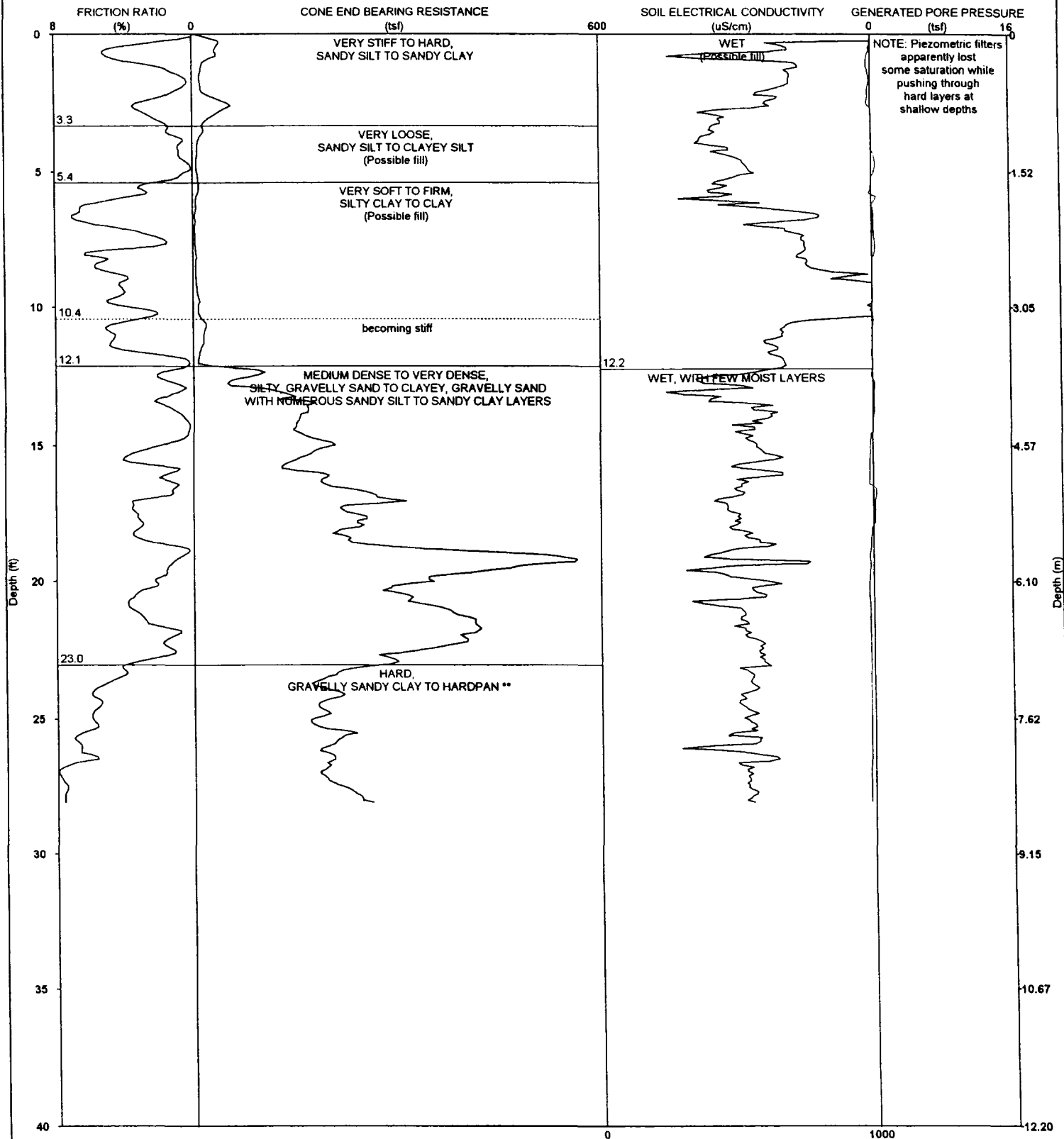
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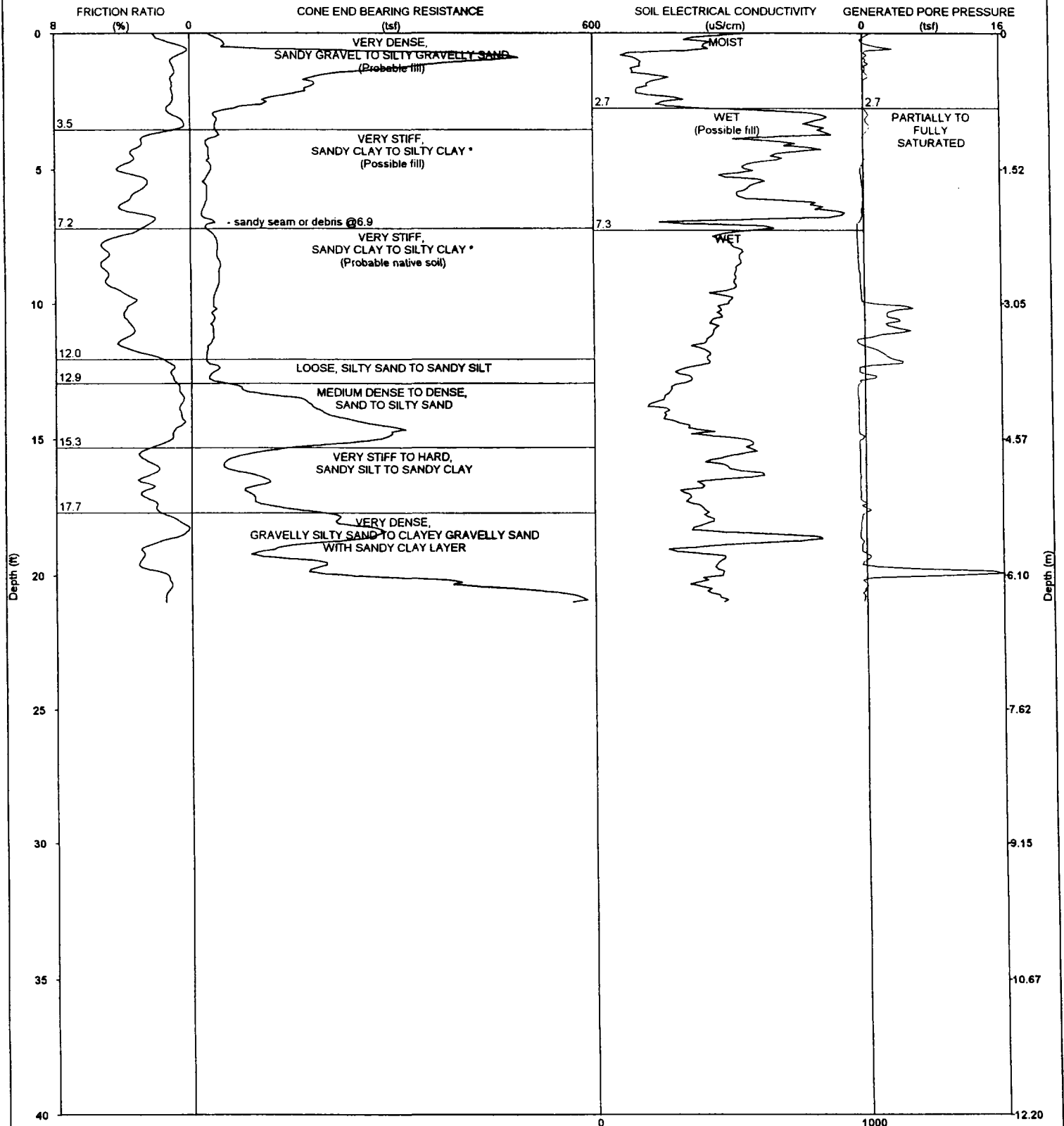


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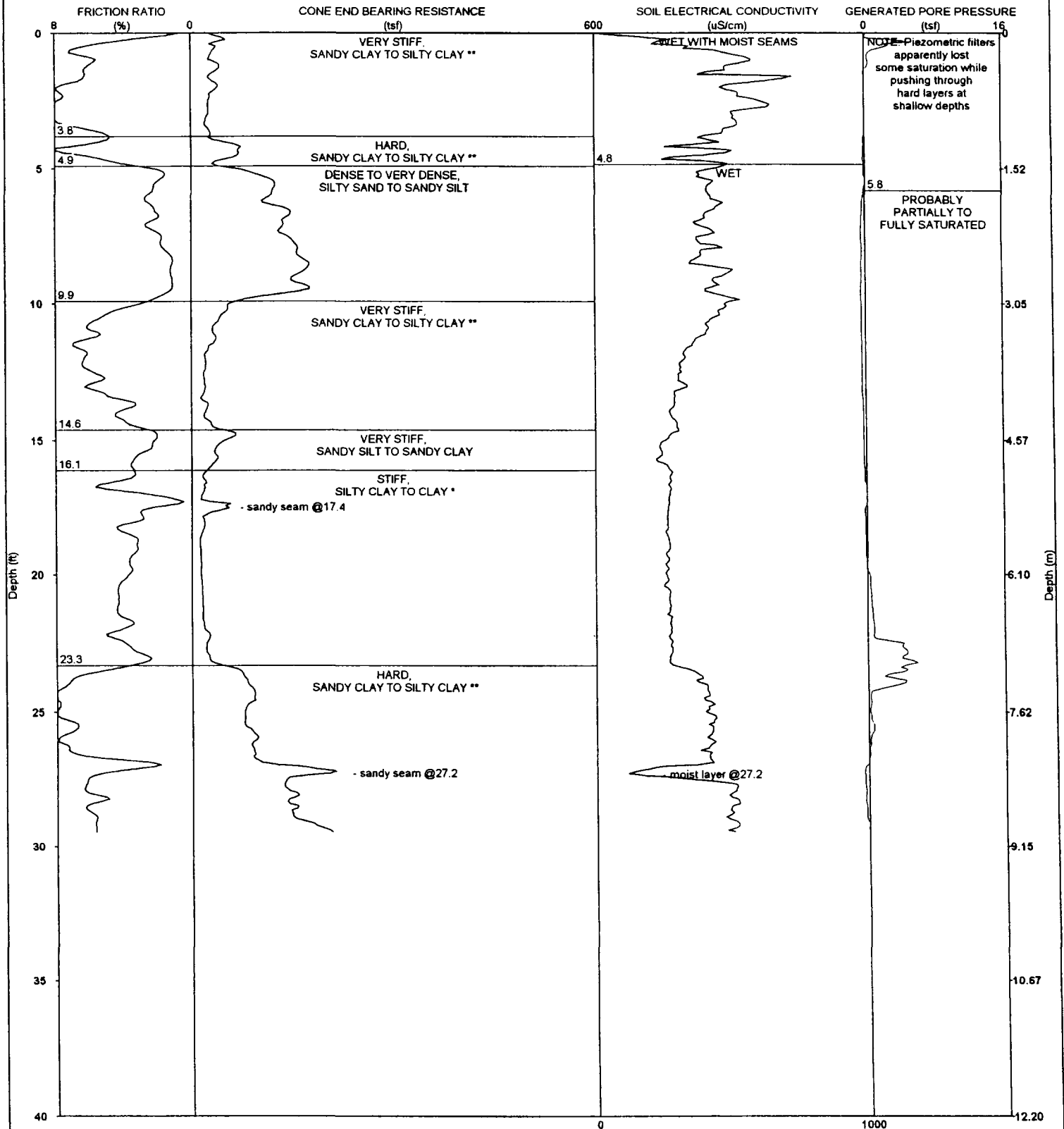




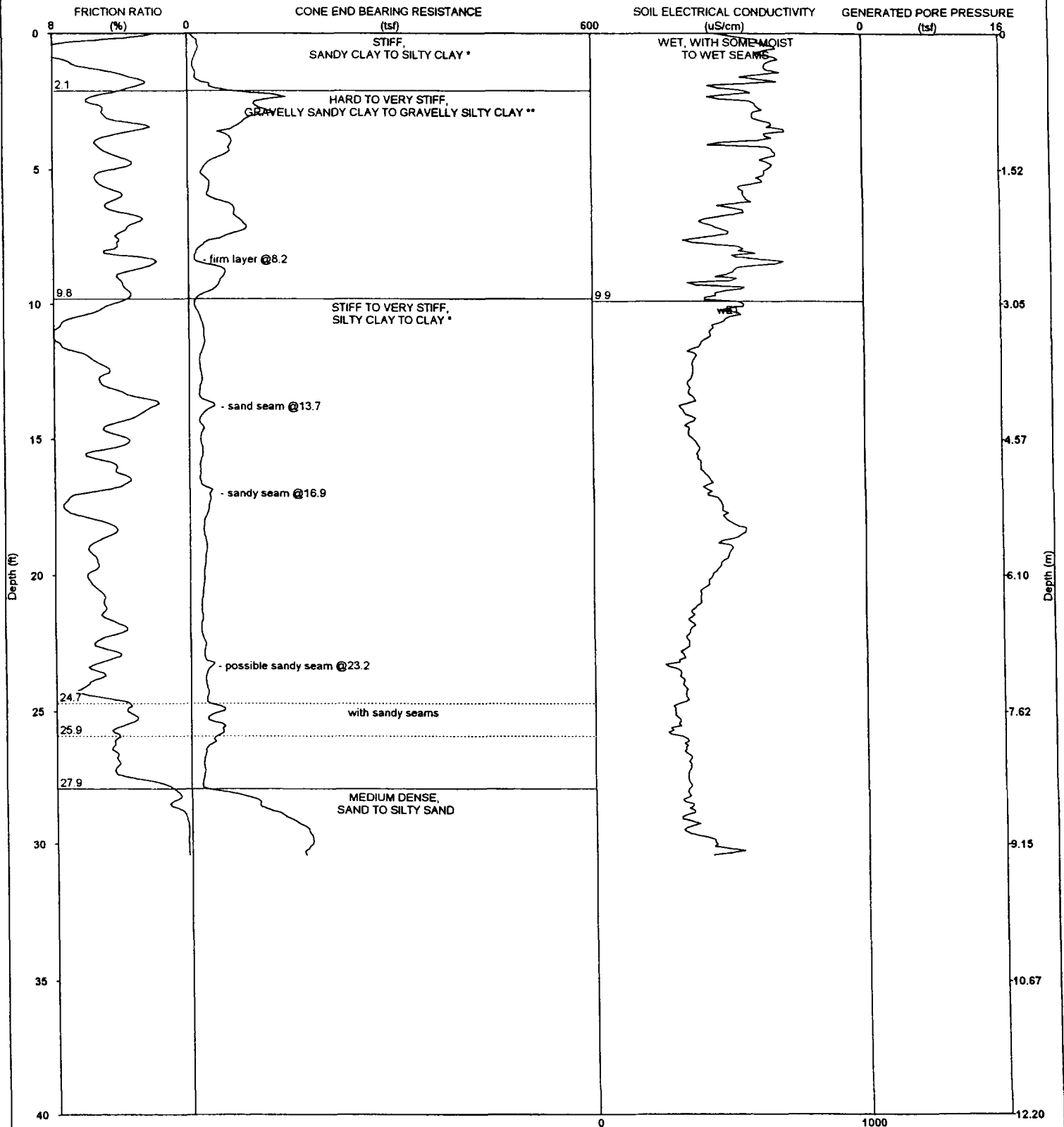
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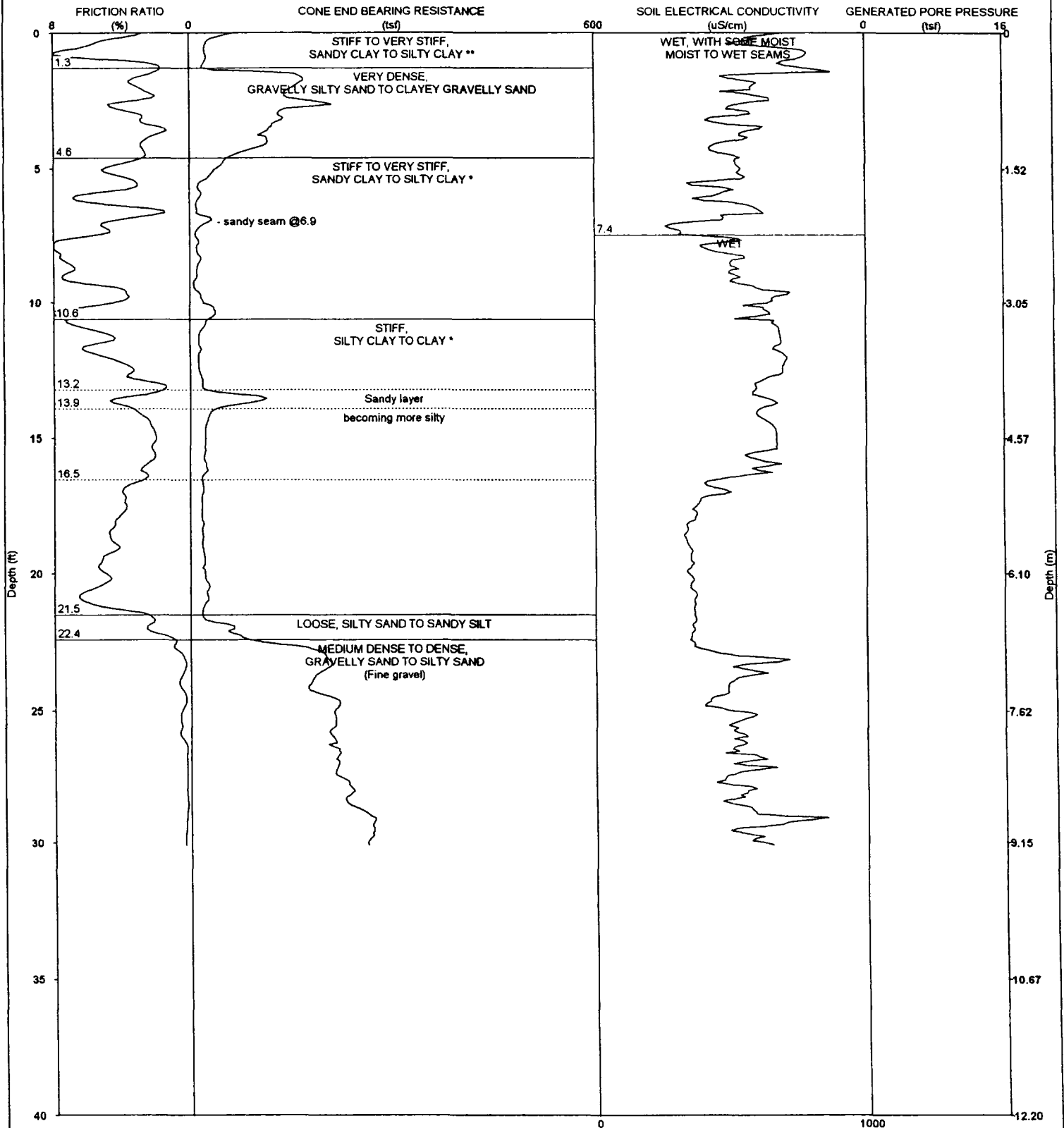
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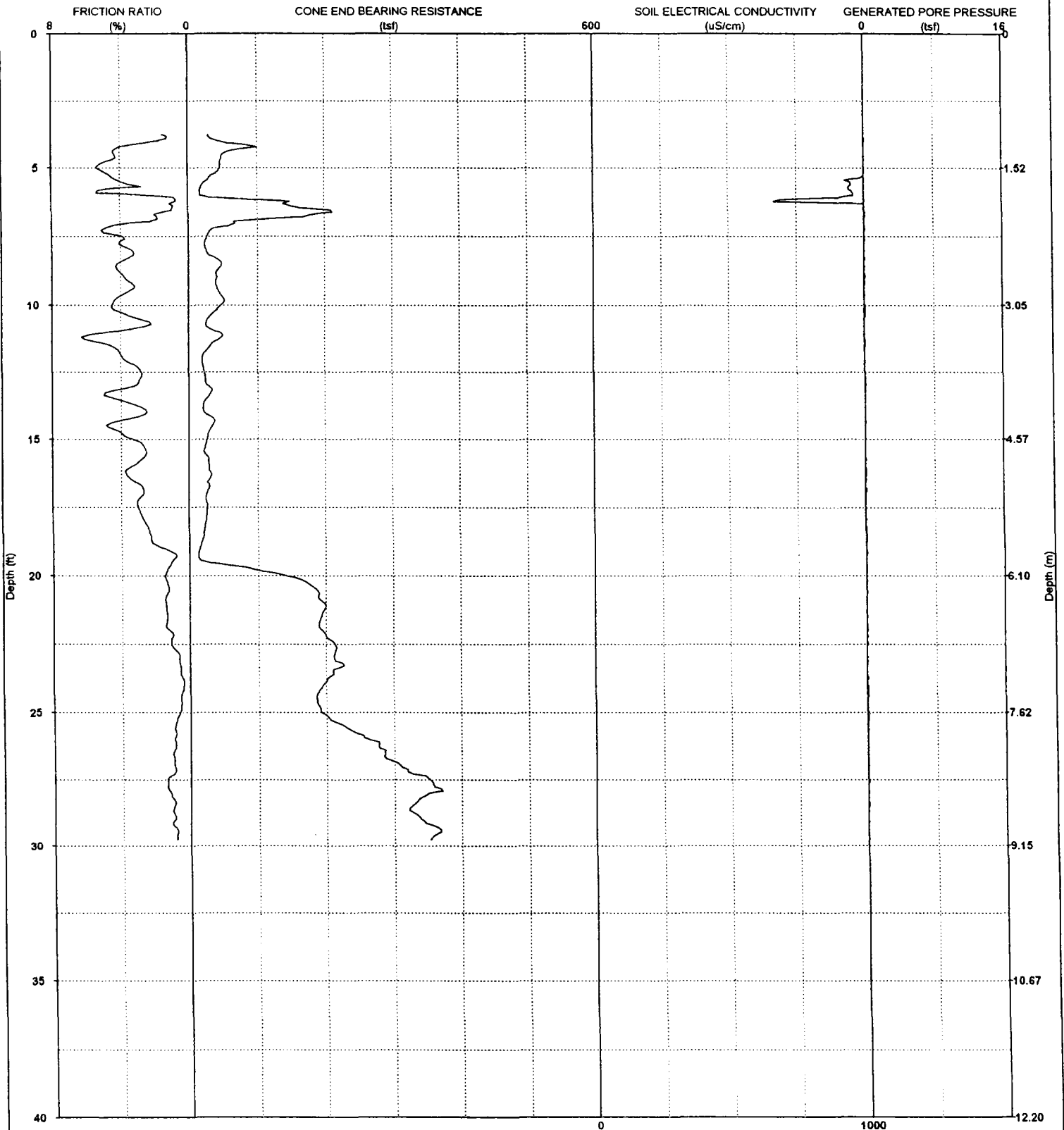
# CPT-EC LOG WITH LITHOLOGIC EVALUATION



# CPT-EC LOG WITH LITHOLOGIC EVALUATION



# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:10:57:46.27

SOUNDING NUMBER:CP-001A

Page 1

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0							Prepunched To 3.80'							
1.5							Prepunched To 3.80'							
2.0							Prepunched To 3.80'							
2.5							Prepunched To 3.80'							
3.0							Prepunched To 3.80'							
3.5							Prepunched To 3.80'							
4.0	42.9	56.2	1.01	1.8	0.1	1322	Medium dense, Silty sand to sandy silt	36-37	40-60				11 - 15	15 - 20
4.5	50.0	64.2	2.94	4.3	-0.0	1039	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	3.32	5.89	31 - 47	40 - 60
5.0	45.8	57.8	2.56	5.3	-0.0	1075	Very stiff, Sandy clay to silty clay *			30	3.03	5.12	32 - 48	40 - 60
5.5	24.8	30.8	1.43	4.0	0.0	946	Very stiff, Silty clay to clay *			20	2.45	2.87	12 - 16	15 - 20
6.0	17.1	20.9	1.97	2.5	-0.0	960	Very stiff, Sandy clay to silty clay *			15	2.23	3.94	03 - 05	04 - 06
6.5	176.0	212.0	1.44	1.0	0.1	4990	Dense, Sand to silty sand	42-46	60-80				33 - 50	40 - 60
7.0	66.7	79.3	4.83	3.0	-0.0	14000	Hard, Sandy silt to sandy clay			30	4.42	9.66	25 - 34	30 - 40
7.5	27.3	32.0	1.50	4.0	0.0	14000	Very stiff, Sandy clay to silty clay *			25	2.15	3.00	13 - 17	15 - 20
8.0	25.9	30.0	1.20	3.3	0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.54	2.40	09 - 13	10 - 15
8.5	48.1	55.1	1.84	4.2	0.0	14000	Very stiff, Sandy clay to silty clay *			25	3.81	3.67	26 - 35	30 - 40
9.0	40.5	46.0	1.60	3.7	0.1	14000	Very stiff, Sandy clay to silty clay *			25	3.20	3.19	18 - 26	20 - 30
9.5	44.3	49.7	1.72	3.5	-0.0	14000	Very stiff, Sandy clay to silty clay *			25	3.50	3.44	18 - 27	20 - 30
10.0	48.5	51.6	2.20	4.5	0.1	14000	Very stiff, Silty clay to clay *			25	3.67	4.40	27 - 36	30 - 40
10.5	27.8	30.5	1.11	3.0	0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.69	2.21	09 - 14	10 - 15
11.0	43.0	47.3	1.87	4.5	-0.0	14000	Very stiff, Silty clay to clay *			25	3.39	3.73	27 - 36	30 - 40
11.5	31.6	34.6	1.93	4.7	0.1	14000	Very stiff, Silty clay to clay *			25	2.47	3.86	18 - 27	20 - 30
12.0	19.8	21.6	0.93	3.8	0.0	14000	Stiff, Silty clay to clay *			20	1.91	1.86	06 - 09	06 - 10
12.5	22.8	24.7	0.67	2.8	0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.20	1.34	06 - 09	06 - 10
13.0	27.2	29.4	0.92	3.2	0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.64	1.84	08 - 14	10 - 15
13.5	25.0	26.9	1.30	4.3	0.0	14000	Very stiff, Silty clay to clay *			20	2.42	2.59	14 - 19	15 - 20
14.0	21.7	23.3	0.77	2.5	-0.0	14000	Very stiff, Sandy silt to sandy clay			20	2.08	1.54	06 - 09	06 - 10
14.5	33.4	35.7	1.60	4.8	0.0	14000	Very stiff, Silty clay to clay *			25	2.60	3.19	19 - 28	20 - 30
15.0	26.1	27.8	0.95	3.3	-0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.52	1.90	09 - 14	10 - 15
15.5	22.6	24.0	0.67	2.5	0.0	14000	Very stiff, Sandy silt to sandy clay			20	2.17	1.34	06 - 09	06 - 10
16.0	28.4	30.0	0.98	3.4	-0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.75	1.96	09 - 14	10 - 15
16.5	28.4	29.8	1.02	3.4	0.1	14000	Very stiff, Sandy clay to silty clay *			20	2.74	2.04	10 - 14	10 - 15
17.0	25.2	26.4	0.73	2.7	0.0	14000	Very stiff, Sandy silt to sandy clay			20	2.41	1.45	06 - 10	06 - 10
17.5	25.9	27.0	0.76	3.0	0.0	14000	Very stiff, Sandy clay to silty clay *			20	2.48	1.53	06 - 10	06 - 10
18.0	24.1	25.1	0.67	2.6	0.0	14000	Very stiff, Sandy silt to sandy clay			20	2.31	1.34	06 - 10	06 - 10
18.5	20.7	21.5	0.51	2.3	0.1	14000	Very stiff, Sandy silt to sandy clay			15	2.62	1.02	04 - 06	04 - 06
19.0	14.4	14.9	0.27	1.5	0.0	14000	Stiff, Sandy silt to clayey silt			15	1.77	0.54	00 - 02	00 - 02
19.5	26.2	26.9	0.94	1.1	-0.0	14000	Loose, Silty sand to sandy silt	31-36	20-40				04 - 06	04 - 06
20.0	142.0	145.6	2.52	1.5	-0.0	14000	Dense, Sand to silty sand	40-42	60-80				39 - 59	40 - 60
20.5	186.1	190.2	2.32	1.2	0.0	14000	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.0	197.6	201.2	2.80	1.4	-0.0	14000	Dense, Sand to silty sand	40-42	60-80				39 - 59	40 - 60
21.5	193.6	196.5	2.63	1.3	0.0	14000	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
22.0	194.4	196.7	2.48	1.2	0.0	14000	Dense, Sand to silty sand	42-46	60-80				40 - 59	40 - 60
22.5	213.7	215.5	2.36	1.1	0.0	14000	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60
23.0	212.3	213.4	1.44	0.6	0.0	14000	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60
23.5	210.5	210.9	1.27	0.6	-0.0	14000	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60
24.0	195.1	194.8	0.79	0.4	0.1	14000	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60
24.5	186.2	185.4	1.12	0.6	0.0	14000	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60
25.0	193.2	191.8	1.25	0.6	0.1	14000	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60

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# **STRATIGRAPHICS Evaluated Properties Using Global Database**

Page 2

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:10:57:46.27

SOUNDING NUMBER:CP-001A

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	226.5	224.2	2.28	0.9	-0.0	14000	Dense, Sand to silty sand	42-46	60-80				40 - 61	40 - 60
26.0	264.9	261.3	2.64	0.9	0.0	14000	Dense, Sand to silty sand	42-46	60-80				41 - 61	40 - 60
26.5	286.3	281.6	3.14	1.0	0.0	14000	Dense, Sand to silty sand	42-46	60-80				61 - 101	60 - 99
27.0	310.1	304.1	3.13	1.0	0.0	14000	Dense, Sand to silty sand	42-46	60-80				61 - 101	60 - 99
27.5	352.9	345.1	5.31	1.4	0.1	14000	Very dense, Sand to silty sand	42-46	80-100				+ 102	+ 100
28.0	351.6	342.8	4.24	1.2	0.1	14000	Very dense, Sand to silty sand	42-46	80-100				+ 103	+ 100
28.5	324.3	315.3	3.36	1.0	0.1	14000	Dense, Sand to silty sand	42-46	60-80				62 - 102	60 - 99
29.0	342.2	331.8	3.54	1.0	0.0	14000	Dense, Sand to silty sand	42-46	60-80				62 - 102	60 - 99
29.5	365.0	352.8	3.30	0.8	-0.0	14000	Dense, Sand to silty sand	42-46	60-80				62 - 102	60 - 99

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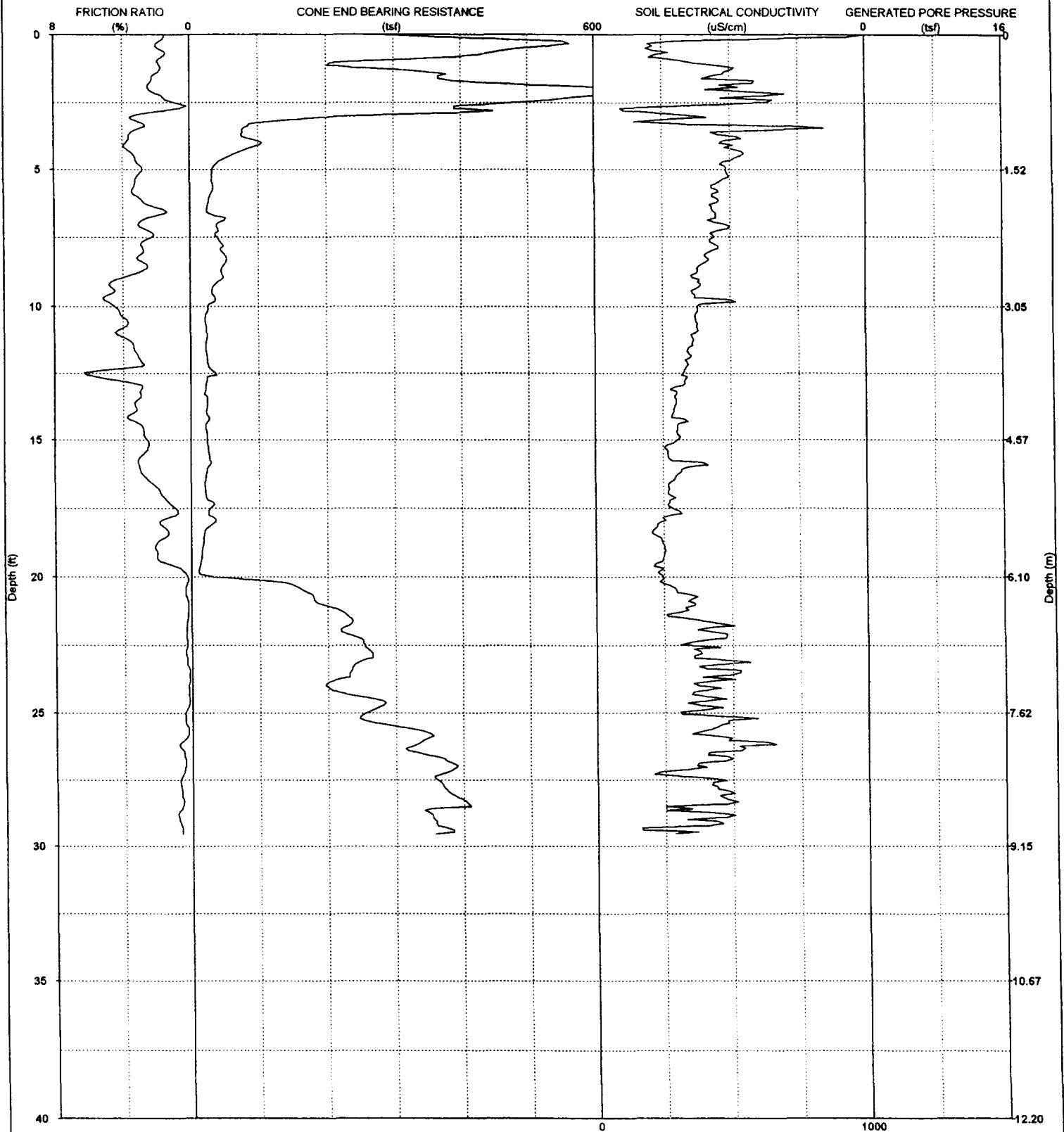
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# CPT-EC LOG





**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:11:50:34.59

SOUNDING NUMBER:CP-002

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	148.4	239.1	2.02	2.0	0.0	340	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+ 62	+ 100
1.5	369.7	563.0	10.67	2.2	0.0	440	Very dense, Sandy gravel to silty gravelly sand	40-42	+100				+ 66	+ 100
2.0	691.9	1010.4	14.91	2.4	-0.1	412	Very dense, Sandy gravel to silty gravelly sand	40-42	+100				+ 68	+ 100
2.5	478.8	676.0	6.05	0.9	-0.1	596	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 71	+ 100
3.0	236.6	324.7	13.57	3.4	-0.1	384	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 73	+ 100
3.5	77.2	103.3	3.93	3.2	-0.0	695	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.13	7.86	30 - 45	40 - 60
4.0	106.8	139.9	3.31	3.8	-0.1	464	Hard, Gravelly clayey sand to gravelly sandy silt			33	6.46	8.62	+ 76	+ 100
4.5	58.9	75.6	2.70	3.3	-0.0	536	Very stiff, Sandy silt to sandy clay			30	3.91	5.40	31 - 47	40 - 60
5.0	32.8	41.3	1.18	2.8	-0.1	486	Very stiff, Sandy silt to sandy clay			25	2.60	2.36	12 - 16	15 - 20
5.5	32.5	40.3	1.05	3.3	-0.1	454	Very stiff, Sandy clay to silty clay *			25	2.57	2.11	12 - 16	15 - 20
6.0	28.1	34.4	1.01	3.1	-0.0	433	Very stiff, Sandy clay to silty clay *			25	2.22	2.02	08 - 12	10 - 15
6.5	23.8	28.7	0.55	1.5	-0.1	434	Loose, Silty sand to sandy silt	27-31	20-40				03 - 05	04 - 06
7.0	40.3	47.9	1.22	3.1	0.0	461	Very stiff, Sandy silt to sandy clay			25	3.19	2.44	17 - 25	20 - 30
7.5	39.5	46.4	0.99	2.3	-0.1	439	Medium dense, Silty sand to sandy silt	27-31	40-60				13 - 17	15 - 20
8.0	45.9	53.2	1.39	2.8	-0.0	430	Very stiff, Sandy silt to sandy clay			25	3.64	2.78	17 - 26	20 - 30
8.5	49.9	57.2	1.27	2.6	-0.0	392	Very stiff, Sandy silt to sandy clay			25	3.95	2.54	17 - 26	20 - 30
9.0	47.2	53.5	1.99	4.2	-0.1	373	Very stiff, Sandy clay to silty clay *			25	3.73	3.99	26 - 35	30 - 40
9.5	31.3	35.2	1.63	4.6	-0.0	360	Very stiff, Silty clay to clay *			25	2.46	3.26	18 - 27	20 - 30
10.0	24.6	27.4	1.46	4.5	0.0	376	Very stiff, Silty clay to clay *			20	2.40	2.92	14 - 18	15 - 20
10.5	21.4	23.7	0.86	3.7	-0.0	372	Very stiff, Silty clay to clay *			20	2.08	1.72	09 - 14	10 - 15
11.0	23.7	26.1	1.03	4.4	-0.0	363	Very stiff, Silty clay to clay *			20	2.30	2.06	14 - 18	15 - 20
11.5	21.8	23.9	0.78	3.4	-0.1	349	Very stiff, Sandy clay to silty clay *			20	2.11	1.55	05 - 09	06 - 10
12.0	24.4	26.6	0.81	3.0	-0.1	331	Very stiff, Sandy clay to silty clay *			20	2.37	1.62	06 - 09	06 - 10
12.5	37.0	40.2	1.85	6.3	-0.0	325	Very stiff, Sandy clay to silty clay **			25	2.90	3.71	37 - 55	40 - 60
13.0	21.9	23.7	0.73	2.9	-0.0	307	Very stiff, Sandy clay to silty clay *			20	2.11	1.46	06 - 09	06 - 10
13.5	24.1	25.9	0.74	3.1	-0.0	299	Very stiff, Sandy clay to silty clay *			20	2.33	1.48	06 - 09	06 - 10
14.0	22.8	24.5	0.81	3.4	-0.0	288	Very stiff, Sandy clay to silty clay *			20	2.20	1.62	06 - 09	06 - 10
14.5	21.4	22.8	0.69	2.9	-0.0	303	Very stiff, Sandy clay to silty clay *			20	2.05	1.38	06 - 09	06 - 10
15.0	23.7	25.2	0.64	2.6	-0.1	303	Very stiff, Sandy silt to sandy clay			20	2.28	1.28	06 - 09	06 - 10
15.5	26.8	28.4	0.77	2.8	-0.1	267	Very stiff, Sandy clay to silty clay *			20	2.59	1.54	06 - 09	06 - 10
16.0	24.6	26.0	0.84	3.0	-0.1	341	Very stiff, Sandy clay to silty clay *			20	2.37	1.68	06 - 09	06 - 10
16.5	20.8	21.9	0.56	2.5	-0.1	285	Stiff, Sandy silt to sandy clay			20	1.98	1.11	04 - 06	04 - 06
17.0	21.0	22.0	0.49	1.8	0.0	272	Very stiff, Sandy silt to clayey silt			15	2.66	0.98	04 - 06	04 - 06
17.5	28.0	29.3	0.29	1.0	0.0	284	Loose, Silty sand to sandy silt	36-37	20-40				04 - 06	04 - 06
18.0	34.5	35.8	0.62	1.9	-0.1	234	Medium dense, Silty sand to sandy silt	27-31	40-60				08 - 10	06 - 10
18.5	18.3	19.0	0.33	1.5	-0.0	229	Loose, Silty sand to sandy silt	27-31	20-40				02 - 04	02 - 04
19.0	15.7	16.2	0.37	2.1	-0.1	255	Stiff, Sandy silt to clayey silt			15	1.94	0.74	04 - 06	04 - 06
19.5	12.8	13.2	0.24	1.6	-0.1	225	Stiff, Sandy silt to clayey silt			15	1.55	0.49	00 - 02	00 - 02
20.0	31.2	32.0	0.26	0.2	0.0	252	Loose, Sand to silty sand	36-37	20-40				04 - 06	04 - 06
20.5	166.4	170.0	0.66	0.4	-0.0	297	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.0	190.7	194.2	0.47	0.2	-0.1	362	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 39	30 - 40
21.5	233.7	237.2	0.52	0.3	-0.1	322	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60
22.0	220.5	223.0	0.75	0.3	-0.1	426	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 59	40 - 60
22.5	254.8	256.9	0.81	0.3	-0.1	343	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
23.0	258.8	260.2	0.83	0.3	-0.0	409	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
23.5	232.8	233.3	0.39	0.2	-0.1	529	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.0	195.8	195.6	0.55	0.2	-0.1	375	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40
24.5	270.1	268.9	0.53	0.2	-0.1	457	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
25.0	255.4	253.5	1.24	0.4	-0.1	309	Dense, Sandy gravel to gravelly sand	42-46	60-80				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:11:50:34.59

SOUNDING NUMBER:CP-002

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	302.4	299.2	1.00	0.3	-0.1	445	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 61	40 - 60
26.0	340.3	335.8	1.80	0.5	-0.1	483	Dense, Sandy gravel to gravelly sand	+46	60-80				61 - 100	60 - 99
26.5	337.0	331.4	1.78	0.5	-0.1	407	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 61	40 - 60
27.0	390.5	383.0	1.60	0.4	-0.1	384	Dense, Sandy gravel to gravelly sand	+46	60-80				61 - 101	60 - 99
27.5	362.0	354.0	2.79	0.7	-0.0	459	Dense, Sand to silty sand	42-46	60-80				61 - 101	60 - 99
28.0	380.4	370.9	2.59	0.7	-0.1	505	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
28.5	395.6	384.6	2.45	0.6	-0.1	274	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
29.0	358.5	347.5	3.03	0.8	-0.0	384	Dense, Sand to silty sand	42-46	60-80				62 - 102	60 - 99
29.5	364.5	352.4	3.62	0.6	-0.1	304	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99

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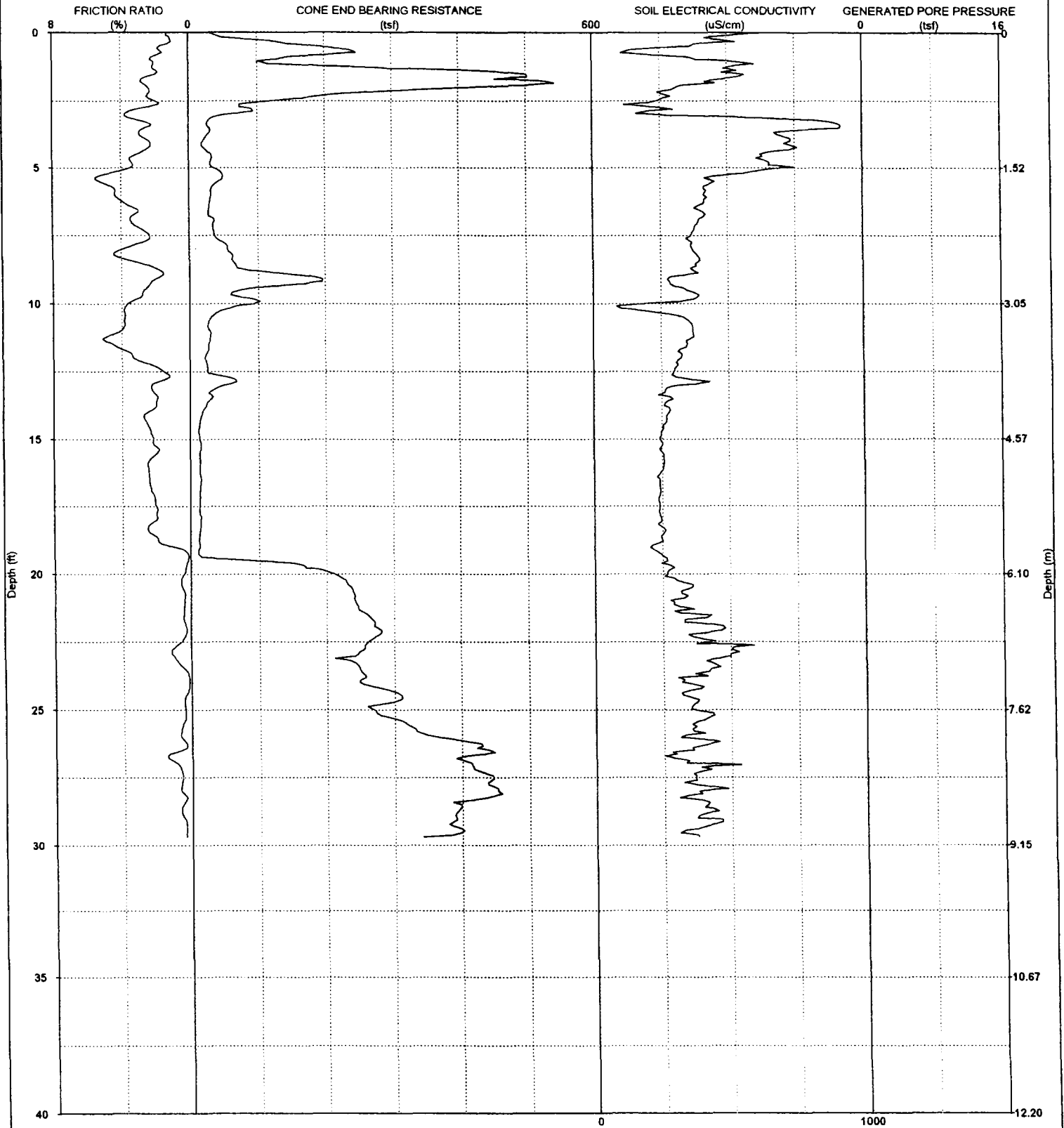
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# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:12:18:18.06

SOUNDING NUMBER:CP-003

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
1.0	-4.4	0.1	4.92	1.9	0.0	717	Fibrous organics	K INPUT.	K INPUT.				K INPUT.	K INPUT.
1.5	493.3	751.2	9.38	2.0	0.0	544	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 86	+ 100
2.0	416.8	608.7	11.85	2.4	-0.0	309	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 68	+ 100
2.5	120.6	170.2	4.51	2.0	-0.1	236	Very dense, Silty sand to sandy silt	40-42	80-100				42 - 70	60 - 89
3.0	59.3	81.3	3.21	3.8	-0.0	218	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	3.94	6.42	29 - 44	40 - 60
3.5	30.1	40.4	0.86	2.5	-0.1	917	Very stiff, Sandy silt to sandy clay			25	2.39	1.72	11 - 15	15 - 20
4.0	20.7	27.1	0.60	2.3	-0.1	735	Very stiff, Sandy silt to sandy clay			20	2.05	1.20	05 - 08	06 - 10
4.5	32.7	42.0	1.00	3.1	-0.1	626	Very stiff, Sandy silt to sandy clay			25	2.59	2.01	12 - 16	15 - 20
5.0	35.8	45.2	1.54	3.5	-0.1	703	Very stiff, Sandy clay to silty clay *			25	2.84	3.07	16 - 24	20 - 30
5.5	43.5	53.9	2.41	5.3	-0.1	449	Very stiff, Sandy clay to silty clay **			30	2.88	4.83	32 - 48	40 - 60
6.0	32.3	39.4	1.52	4.4	-0.1	412	Very stiff, Silty clay to clay *			25	2.55	3.04	16 - 25	20 - 30
6.5	29.0	34.9	0.97	3.2	-0.1	382	Very stiff, Sandy clay to silty clay *			25	2.29	1.93	12 - 17	15 - 20
7.0	36.0	42.8	1.22	3.4	-0.0	391	Very stiff, Sandy clay to silty clay *			25	2.85	2.44	17 - 25	20 - 30
7.5	37.5	43.9	1.10	2.3	-0.1	364	Very stiff, Sandy silt to sandy clay			25	2.96	2.20	13 - 17	15 - 20
8.0	55.9	64.8	2.29	3.8	-0.0	368	Very stiff, Sandy clay to silty clay *			30	3.70	4.58	35 - 52	40 - 60
8.5	64.2	73.6	2.90	3.1	-0.1	387	Hard, Sandy silt to sandy clay			30	4.25	5.81	26 - 35	30 - 40
9.0	188.8	191.4	2.47	1.7	-0.1	313	Dense, Sand to silty sand	40-42	80-80				53 - 87	60 - 99
9.5	78.3	87.9	4.04	2.6	-0.1	345	Very dense, Silty sand to sandy silt	36-37	80-100				36 - 53	40 - 60
10.0	93.9	104.4	2.93	3.7	-0.1	188	Hard, Gravelly clayey sand to gravelly sandy silt			30	6.22	5.86	54 - 89	60 - 99
10.5	31.1	34.3	1.82	3.8	0.0	338	Very stiff, Sandy clay to silty clay *			25	2.43	3.85	14 - 18	15 - 20
11.0	29.5	32.5	1.19	4.1	-0.0	368	Very stiff, Silty clay to clay *			25	2.31	2.38	14 - 18	15 - 20
11.5	27.2	29.8	1.31	4.5	-0.1	348	Very stiff, Silty clay to clay *			25	2.12	2.62	14 - 18	15 - 20
12.0	22.2	24.2	0.85	3.3	0.0	325	Very stiff, Sandy clay to silty clay *			20	2.15	1.70	06 - 09	06 - 10
12.5	25.4	27.6	0.78	1.6	-0.0	297	Loose, Silty sand to sandy silt	27-31	20-40				04 - 06	04 - 06
13.0	52.5	56.8	1.17	2.3	-0.1	340	Dense, Silty sand to sandy silt	27-31	60-80				18 - 28	20 - 30
13.5	31.5	33.9	0.89	2.0	-0.0	291	Medium dense, Silty sand to sandy silt	27-31	40-60				06 - 09	06 - 10
14.0	18.2	19.5	0.59	2.5	-0.0	279	Very stiff, Sandy clay to silty clay *			15	2.32	1.18	04 - 06	04 - 06
14.5	13.1	14.0	0.37	2.5	-0.0	256	Stiff, Clayey silt to silty clay			15	1.63	0.75	02 - 04	02 - 04
15.0	13.9	14.8	0.32	2.2	-0.1	243	Stiff, Sandy silt to clayey silt			15	1.73	0.64	02 - 04	02 - 04
15.5	14.1	14.9	0.29	1.9	-0.1	253	Stiff, Sandy silt to clayey silt			15	1.76	0.58	02 - 04	02 - 04
16.0	13.6	14.4	0.35	2.5	-0.1	255	Stiff, Clayey silt to silty clay			15	1.69	0.70	04 - 06	04 - 06
16.5	15.2	16.0	0.35	2.4	-0.0	241	Stiff, Clayey silt to silty clay			15	1.89	0.70	04 - 06	04 - 06
17.0	13.5	14.2	0.32	2.2	-0.0	243	Stiff, Clayey silt to silty clay			15	1.67	0.64	02 - 04	02 - 04
17.5	13.0	13.6	0.28	2.0	-0.0	240	Stiff, Sandy silt to clayey silt			15	1.60	0.56	02 - 04	02 - 04
18.0	14.2	14.8	0.28	2.0	-0.1	247	Stiff, Sandy silt to clayey silt			15	1.75	0.56	02 - 04	02 - 04
18.5	12.7	13.1	0.34	2.3	0.0	255	Stiff, Clayey silt to silty clay			15	1.54	0.67	02 - 04	02 - 04
19.0	13.0	13.4	0.20	1.0	-0.0	207	Loose, Silty sand to sandy silt	27-31	20-40				00 - 02	00 - 02
19.5	82.1	84.5	0.32	0.2	-0.1	269	Loose, Sand to silty sand	40-42	20-40				10 - 15	10 - 15
20.0	211.7	217.1	0.91	0.4	-0.1	268	Medium dense, Sand to silty sand	42-46	40-60				39 - 59	40 - 60
20.5	237.1	242.3	1.34	0.5	-0.0	355	Dense, Sand to silty sand	42-46	80-80				39 - 59	40 - 60
21.0	242.6	247.1	1.03	0.4	-0.0	286	Dense, Sandy gravel to gravelly sand	42-46	80-80				39 - 59	40 - 60
21.5	261.1	265.0	1.18	0.4	0.0	401	Dense, Sandy gravel to gravelly sand	42-46	80-80				39 - 59	40 - 60
22.0	276.4	279.6	0.86	0.3	-0.0	482	Dense, Sandy gravel to gravelly sand	+46	80-80				40 - 59	40 - 60
22.5	261.9	264.1	1.61	0.6	-0.0	428	Dense, Sand to silty sand	42-46	80-80				40 - 60	40 - 60
23.0	244.4	245.6	2.59	1.1	-0.0	501	Dense, Sand to silty sand	42-46	80-80				40 - 60	40 - 60
23.5	249.1	249.5	1.06	0.4	-0.0	434	Dense, Sandy gravel to gravelly sand	42-46	80-80				40 - 60	40 - 60
24.0	247.9	247.5	0.43	0.2	-0.0	319	Medium dense, Sandy gravel to gravelly sand	+46	40-60				40 - 60	40 - 60
24.5	311.1	309.7	1.17	0.4	-0.1	332	Dense, Sandy gravel to gravelly sand	+46	80-80				40 - 60	40 - 60
25.0	269.3	267.3	1.15	0.4	-0.1	368	Dense, Sandy gravel to gravelly sand	+46	80-80				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:12:18:18.06

SOUNDING NUMBER:CP-003

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	318.2	314.9	1.85	0.5	-0.0	359	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 61	40 - 60
26.0	367.3	362.3	2.76	0.6	-0.1	314	Dense, Sandy gravel to gravelly sand	+46	60-80				61 - 100	60 - 99
26.5	443.3	436.0	2.68	0.7	-0.0	342	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 102	+ 100
27.0	414.4	406.4	3.65	0.9	-0.0	432	Very dense, Sand to silty sand	42-46	80-100				+ 102	+ 100
27.5	447.0	437.1	2.54	0.6	-0.1	366	Very dense, Sandy gravel to gravelly sand	+46	80-100				61 - 101	60 - 99
28.0	453.2	441.8	3.10	0.7	-0.1	378	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 103	+ 100
28.5	398.9	387.8	2.50	0.6	-0.0	409	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
29.0	392.1	380.1	1.86	0.5	-0.1	419	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
29.5	399.6	386.3	2.41	0.4	-0.1	313	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99

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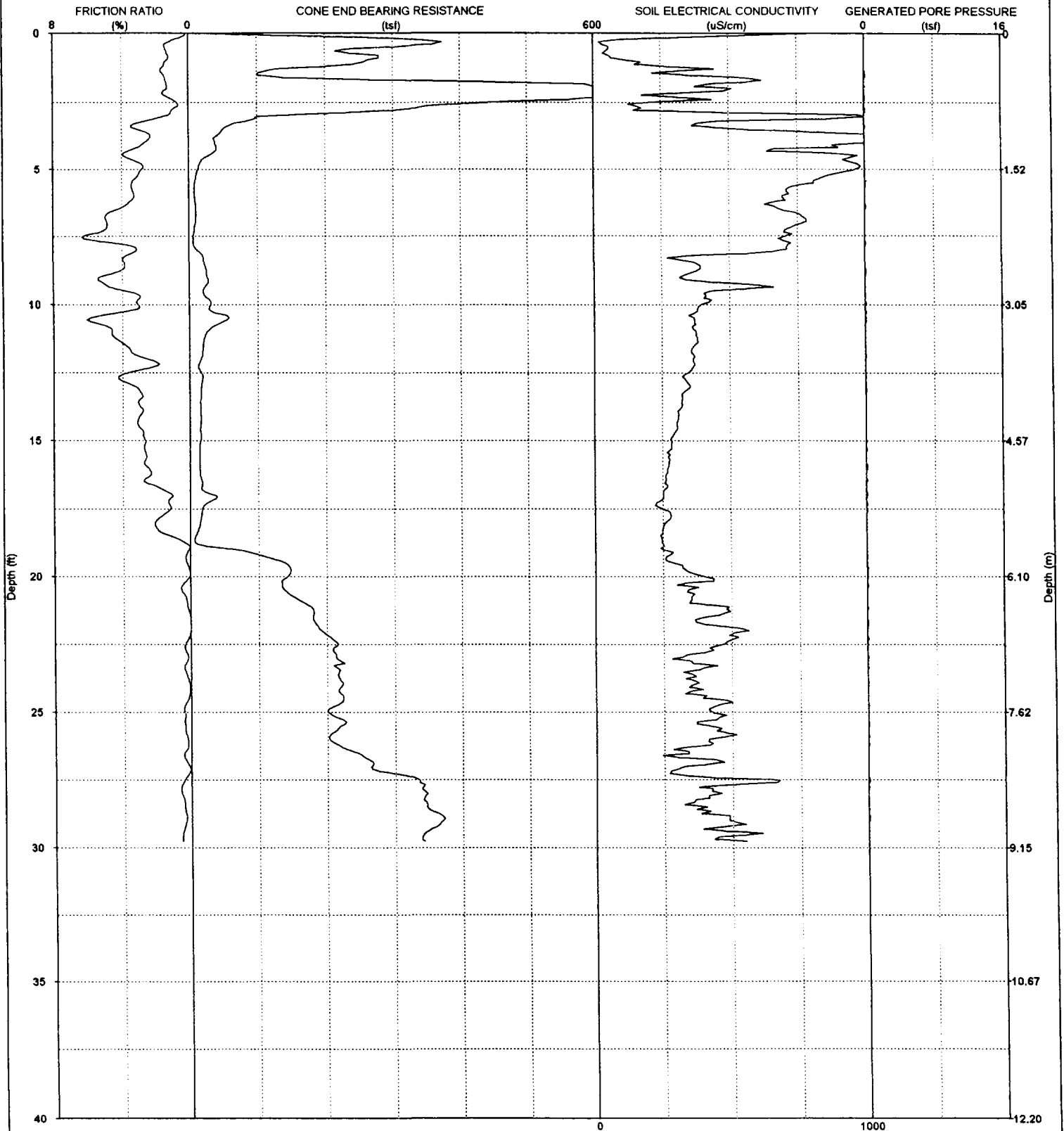
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# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:12:57:50.79

SOUNDING NUMBER:CP-004

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	307.5	495.4	2.73	1.3	0.0	-19	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 62	+ 100
1.5	101.7	154.9	5.41	1.5	0.1	316	Dense, Sand to silty sand	40-42	60-80				26 - 39	40 - 60
2.0	701.3	1024.1	8.38	1.3	0.0	514	Very dense, Sandy gravel to silty gravelly sand	+46	+100				+ 68	+ 100
2.5	445.8	629.4	4.66	0.7	0.0	209	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 71	+ 100
3.0	124.3	170.6	3.81	1.4	0.0	1037	Dense, Sand to silty sand	40-42	60-80				29 - 44	40 - 60
3.5	50.0	67.0	2.36	3.1	0.0	535	Very stiff, Sandy silt to sandy clay			25	3.99	4.71	22 - 30	30 - 40
4.0	38.3	50.2	1.09	2.7	0.0	1006	Very stiff, Sandy silt to sandy clay			25	3.04	2.18	11 - 15	15 - 20
4.5	27.2	34.9	1.43	3.8	0.0	966	Very stiff, Sandy clay to silty clay *			25	2.15	2.86	12 - 16	15 - 20
5.0	12.7	16.0	0.49	2.8	0.0	967	Stiff, Sandy clay to silty clay *			15	1.65	0.98	03 - 05	04 - 06
5.5	8.2	10.2	0.35	3.4	0.1	810	Stiff, Silty clay to clay			15	1.05	0.70	02 - 03	02 - 04
6.0	7.9	9.7	0.29	3.3	0.0	694	Stiff, Silty clay to clay			15	1.01	0.58	02 - 03	02 - 04
6.5	10.0	12.0	0.42	4.2	0.0	685	Stiff, Silty clay to clay *			15	1.28	0.83	03 - 05	04 - 06
7.0	8.7	10.4	0.48	4.9	0.0	774	Stiff, Silty clay to clay *			15	1.11	0.95	03 - 05	04 - 06
7.5	8.0	7.0	0.47	6.3	0.0	711	Firm, Clay			12	0.92	0.94	03 - 05	04 - 06
8.0	10.8	12.5	0.53	3.1	0.0	712	Stiff, Sandy clay to silty clay *			15	1.37	1.06	03 - 05	04 - 06
8.5	21.3	24.4	0.91	3.9	0.0	375	Very stiff, Silty clay to clay *			20	2.07	1.83	09 - 13	10 - 15
9.0	25.3	28.7	1.32	5.3	0.0	322	Stiff, Silty clay to clay *			25	1.88	2.64	18 - 26	20 - 30
9.5	19.6	22.0	0.99	3.9	0.0	462	Stiff, Silty clay to clay *			20	1.91	1.98	09 - 13	10 - 15
10.0	30.5	33.8	1.20	3.1	0.1	393	Very stiff, Sandy clay to silty clay *			20	2.99	2.40	09 - 14	10 - 15
10.5	58.8	62.8	2.56	5.9	0.1	369	Very stiff, Sandy clay to silty clay **			30	3.74	5.12	54 - 90	60 - 99
11.0	25.3	27.8	1.81	4.6	0.0	375	Very stiff, Silty clay to clay *			20	2.46	3.62	14 - 18	15 - 20
11.5	19.5	21.4	0.82	3.8	0.0	368	Stiff, Silty clay to clay *			20	1.88	1.64	05 - 09	06 - 10
12.0	18.0	17.5	0.47	2.5	0.0	363	Very stiff, Sandy clay to silty clay *			15	2.04	0.94	04 - 06	04 - 06
12.5	16.8	18.3	0.66	3.7	0.0	344	Very stiff, Silty clay to clay *			15	2.15	1.32	06 - 09	06 - 10
13.0	16.5	17.9	0.56	3.3	0.0	353	Very stiff, Sandy clay to silty clay *			15	2.10	1.13	06 - 09	06 - 10
13.5	14.9	16.0	0.48	3.0	0.0	322	Stiff, Sandy clay to silty clay *			15	1.88	0.87	04 - 06	04 - 06
14.0	15.4	16.5	0.44	2.9	0.0	312	Stiff, Sandy clay to silty clay *			15	1.95	0.88	04 - 06	04 - 06
14.5	15.1	16.1	0.48	3.0	0.0	307	Stiff, Sandy clay to silty clay *			15	1.89	0.96	04 - 06	04 - 06
15.0	15.0	15.9	0.39	2.7	0.0	283	Stiff, Sandy clay to silty clay *			15	1.88	0.79	04 - 06	04 - 06
15.5	13.6	14.4	0.37	2.6	0.0	275	Stiff, Clayey silt to silty clay			15	1.69	0.74	04 - 06	04 - 06
16.0	14.3	15.1	0.37	2.5	0.1	271	Stiff, Clayey silt to silty clay			15	1.77	0.74	04 - 06	04 - 06
16.5	17.3	18.2	0.59	2.7	0.0	260	Very stiff, Sandy clay to silty clay *			15	2.17	1.19	04 - 06	04 - 06
17.0	35.3	37.0	0.26	1.1	0.0	252	Loose, Silty sand to sandy silt	36-37	20-40				06 - 10	06 - 10
17.5	17.3	18.1	0.31	1.2	0.1	248	Loose, Silty sand to sandy silt	27-31	20-40				02 - 04	02 - 04
18.0	14.1	14.7	0.34	2.1	0.0	260	Stiff, Sandy silt to clayey silt			15	1.74	0.88	02 - 04	02 - 04
18.5	7.2	7.4	0.19	1.1	0.0	243	Stiff, Sandy silt to clayey silt			10	1.21	0.39	00 - 02	00 - 02
19.0	63.5	65.5	0.10	0.1	0.0	248	Loose, Sand to silty sand	40-42	20-40				06 - 10	06 - 10
19.5	139.6	143.7	0.34	0.2	0.0	285	Medium dense, Sand to silty sand	42-46	40-60				19 - 29	20 - 30
20.0	143.2	146.8	0.10	0.1	0.1	400	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
20.5	138.7	141.8	0.86	0.6	0.0	341	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.0	169.7	172.8	0.41	0.2	0.0	375	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.5	180.0	182.7	0.06	0.0	0.0	408	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 39	30 - 40
22.0	192.7	194.9	0.09	0.0	0.0	564	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40
22.5	215.8	217.6	0.76	0.3	0.0	466	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.0	214.0	215.1	0.38	0.2	0.1	301	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.5	218.4	218.8	0.75	0.3	0.0	336	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.0	222.8	222.5	0.17	0.1	0.0	354	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.5	224.0	223.0	0.36	0.2	0.0	413	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
25.0	201.8	200.3	0.86	0.4	0.0	426	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:12:57:50.79

SOUNDING NUMBER:CP-004

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	220.4	218.1	0.76	0.4	0.0	406	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 61	40 - 60
26.0	203.4	200.7	0.48	0.2	0.0	413	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 41	30 - 40
26.5	240.8	236.8	1.21	0.4	0.0	338	Dense, Sand to silty sand	42-46	60-80				41 - 61	40 - 60
27.0	265.7	260.5	0.41	0.2	-0.0	361	Medium dense, Sandy gravel to gravelly sand	+46	40-60				41 - 61	40 - 60
27.5	334.9	327.5	1.30	0.4	0.1	613	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 61	40 - 60
28.0	348.0	339.3	2.04	0.6	0.0	460	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
28.5	347.4	337.7	1.55	0.4	0.0	396	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
29.0	368.9	357.6	1.30	0.4	0.0	499	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
29.5	341.1	329.8	2.06	0.5	0.0	561	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99

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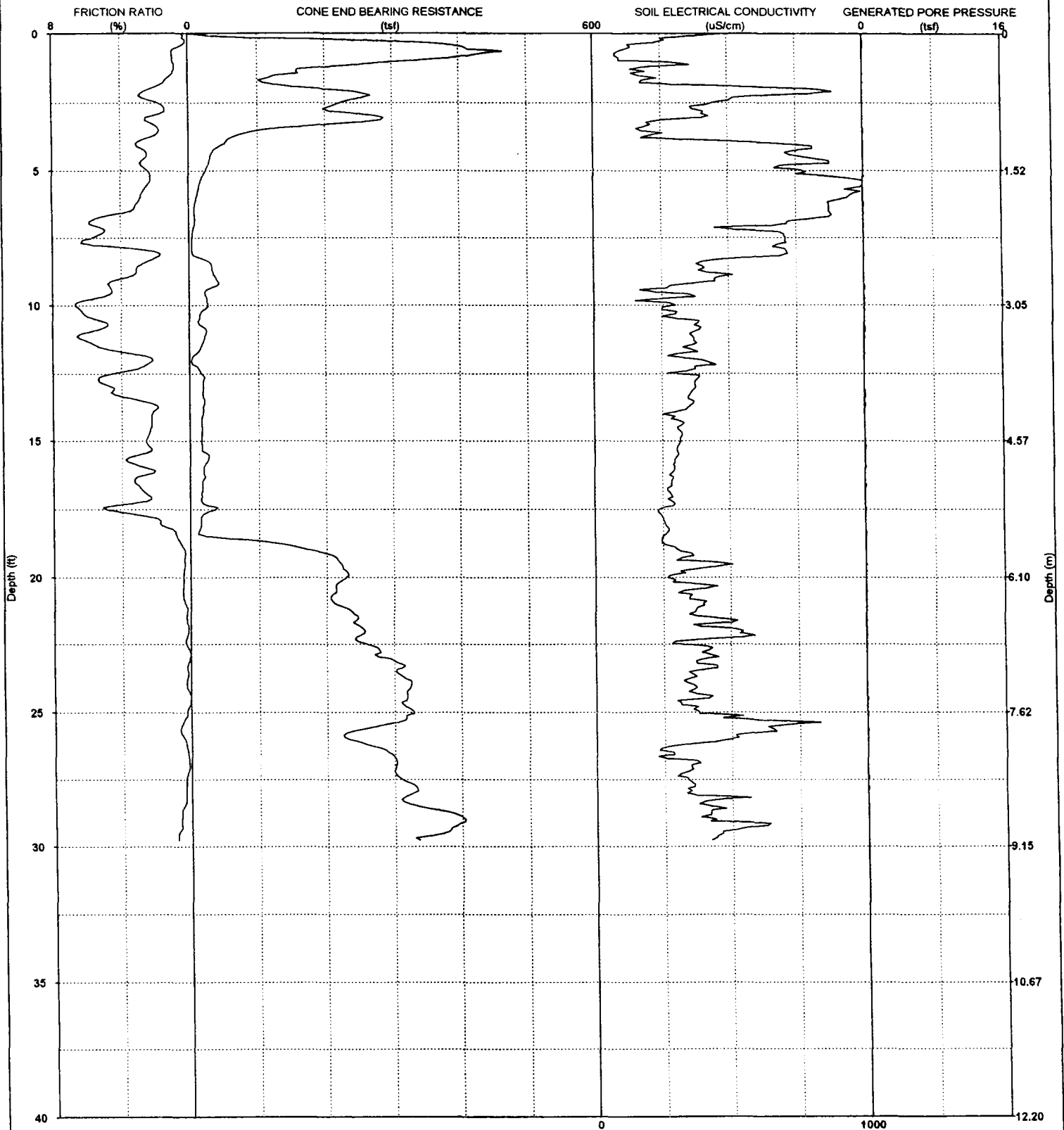
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# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:13:40:22.68

SOUNDING NUMBER:CP-005

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	320.2	515.9	3.78	0.9	-0.0	612	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 62	+ 100
1.5	134.1	204.3	2.01	1.0	0.0	163	Dense, Sand to silty sand	42-46	60-80				26 - 39	40 - 60
2.0	199.3	291.1	5.67	2.3	0.0	826	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 68	+ 100
2.5	222.3	313.8	4.04	1.8	-0.0	444	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 71	+ 100
3.0	282.5	387.8	5.64	2.3	-0.0	417	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 73	+ 100
3.5	106.7	142.8	3.63	1.8	0.0	171	Dense, Silty sand to sandy silt	40-42	60-80				30 - 45	40 - 60
4.0	52.2	68.4	2.19	3.1	-0.0	708	Hard, Sandy silt to sandy clay			25	4.16	4.38	23 - 31	30 - 40
4.5	31.0	39.8	0.96	2.6	-0.0	794	Very stiff, Sandy silt to sandy clay			25	2.46	1.92	08 - 12	10 - 15
5.0	23.9	30.1	0.68	2.4	-0.0	776	Very stiff, Sandy silt to sandy clay			20	2.36	1.36	05 - 08	06 - 10
5.5	15.8	19.5	0.47	2.4	-0.0	1020	Very stiff, Sandy silt to sandy clay			15	2.06	0.94	03 - 05	04 - 06
6.0	10.6	12.9	0.37	2.8	0.0	940	Stiff, Clayey silt to silty clay			15	1.36	0.74	03 - 05	04 - 06
6.5	7.5	9.0	0.29	3.5	0.0	873	Firm, Silty clay to clay			15	0.95	0.57	02 - 03	02 - 04
7.0	7.6	9.0	0.46	5.7	-0.0	694	Firm, Silty clay to clay *			15	0.95	0.93	03 - 05	04 - 06
7.5	3.9	4.6	0.31	5.7	0.0	711	Firm, Clay			10	0.69	0.61	00 - 02	00 - 02
8.0	3.7	4.3	0.29	2.0	-0.0	714	Soft, Clayey silt to silty clay			18	0.35	0.58	00 - 02	00 - 02
8.5	32.5	37.3	0.99	2.9	0.0	386	Very stiff, Sandy silt to sandy clay			25	2.56	1.99	13 - 17	15 - 20
9.0	39.0	44.3	1.37	3.9	0.0	455	Very stiff, Sandy clay to silty clay *			25	3.08	2.73	18 - 26	20 - 30
9.5	22.6	25.3	1.57	4.5	-0.0	209	Very stiff, Silty clay to clay *			20	2.20	3.14	13 - 18	15 - 20
10.0	28.2	31.3	1.67	6.7	0.0	302	Very stiff, Silty clay to clay *			25	2.20	3.34	27 - 36	30 - 40
10.5	13.6	15.1	1.07	5.5	0.0	327	Stiff, Silty clay to clay *			15	1.73	2.14	05 - 09	06 - 10
11.0	24.8	27.3	1.32	6.2	0.1	362	Very stiff, Silty clay to clay *			20	2.41	2.63	18 - 27	20 - 30
11.5	16.9	18.5	1.13	5.3	0.0	339	Stiff, Silty clay to clay *			20	1.62	2.27	09 - 14	10 - 15
12.0	2.4	2.7	0.21	2.2	-0.0	405	Very soft, Sensitive fine grained soil			18	0.19	0.42	00 - 02	00 - 02
12.5	18.1	19.7	0.94	4.5	0.0	301	Stiff, Silty clay to clay *			20	1.73	1.88	09 - 14	10 - 15
13.0	19.5	21.1	0.88	4.5	-0.0	374	Stiff, Silty clay to clay *			20	1.87	1.75	09 - 14	10 - 15
13.5	21.5	23.2	0.60	2.9	0.0	364	Very stiff, Sandy clay to silty clay *			20	2.07	1.19	06 - 09	06 - 10
14.0	18.8	20.1	0.45	2.3	-0.0	252	Very stiff, Sandy silt to sandy clay			15	2.39	0.90	04 - 06	04 - 06
14.5	17.7	18.9	0.40	2.3	-0.0	308	Very stiff, Sandy silt to sandy clay			15	2.24	0.81	04 - 06	04 - 06
15.0	16.7	17.8	0.49	2.6	0.0	317	Very stiff, Sandy clay to silty clay *			15	2.11	0.98	04 - 06	04 - 06
15.5	26.4	28.0	0.71	3.0	-0.0	309	Very stiff, Sandy clay to silty clay *			20	2.55	1.41	09 - 14	10 - 15
16.0	20.0	21.1	0.63	2.5	0.0	296	Very stiff, Sandy silt to sandy clay			15	2.53	1.26	04 - 06	04 - 06
16.5	18.2	19.1	0.65	3.2	0.0	284	Very stiff, Sandy clay to silty clay *			15	2.29	1.30	06 - 10	06 - 10
17.0	17.1	17.9	0.53	2.4	-0.0	286	Very stiff, Sandy clay to silty clay *			15	2.14	1.07	04 - 06	04 - 06
17.5	36.6	38.2	1.22	4.9	0.1	237	Very stiff, Silty clay to clay *			25	2.84	2.45	19 - 29	20 - 30
18.0	15.2	15.8	0.37	1.8	-0.0	258	Stiff, Sandy silt to clayey silt			15	1.88	0.74	02 - 04	02 - 04
18.5	29.8	30.9	0.95	0.8	0.0	249	Loose, Silty sand to sandy silt	36-37	20-40				04 - 06	04 - 06
19.0	178.1	183.9	0.72	0.4	-0.0	310	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
19.5	221.6	228.2	0.78	0.4	0.0	490	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 58	40 - 60
20.0	229.4	235.2	0.98	0.4	-0.0	265	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
20.5	214.3	219.0	1.07	0.5	0.0	318	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.0	214.8	218.7	0.76	0.3	-0.0	399	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60
21.5	247.1	250.8	0.66	0.3	0.0	435	Dense, Sandy gravel to gravelly sand	+46	60-80				39 - 59	40 - 60
22.0	257.2	260.2	0.43	0.2	0.0	546	Medium dense, Sandy gravel to gravelly sand	+46	40-60				40 - 59	40 - 60
22.5	260.2	262.4	0.80	0.3	0.0	312	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
23.0	285.7	287.2	0.23	0.1	-0.0	428	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
23.5	302.7	303.2	0.72	0.2	-0.0	356	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
24.0	324.4	324.0	1.01	0.3	-0.0	364	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
24.5	318.4	317.0	0.13	0.1	0.1	386	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
25.0	328.5	326.0	0.76	0.3	0.0	379	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60

\* Indicates lightly overconsolidated soil

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Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
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Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:13:40:22.68

SOUNDING NUMBER:CP-005

Page 2

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	275.5	272.6	1.85	0.6	-0.0	655	Dense, Sand to silty sand	42-46	60-80				40 - 61	40 - 60
26.0	232.5	229.4	0.96	0.4	0.0	490	Dense, Sandy gravel to gravelly sand	42-46	60-80				41 - 61	40 - 60
26.5	291.8	287.0	0.77	0.3	-0.0	283	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 61	40 - 60
27.0	302.6	296.6	0.43	0.1	-0.0	349	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 61	40 - 60
27.5	310.7	303.8	1.14	0.3	0.0	338	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 61	40 - 60
28.0	327.4	319.2	1.11	0.3	-0.0	332	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
28.5	337.9	328.5	1.84	0.5	0.0	432	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
29.0	404.7	392.3	2.41	0.6	0.0	429	Dense, Sandy gravel to gravelly sand	+46	60-80				62 - 102	60 - 99
29.5	373.6	361.1	3.53	0.8	-0.0	462	Dense, Sand to silty sand	42-46	60-80				62 - 102	60 - 99

\* Indicates lightly overconsolidated soil

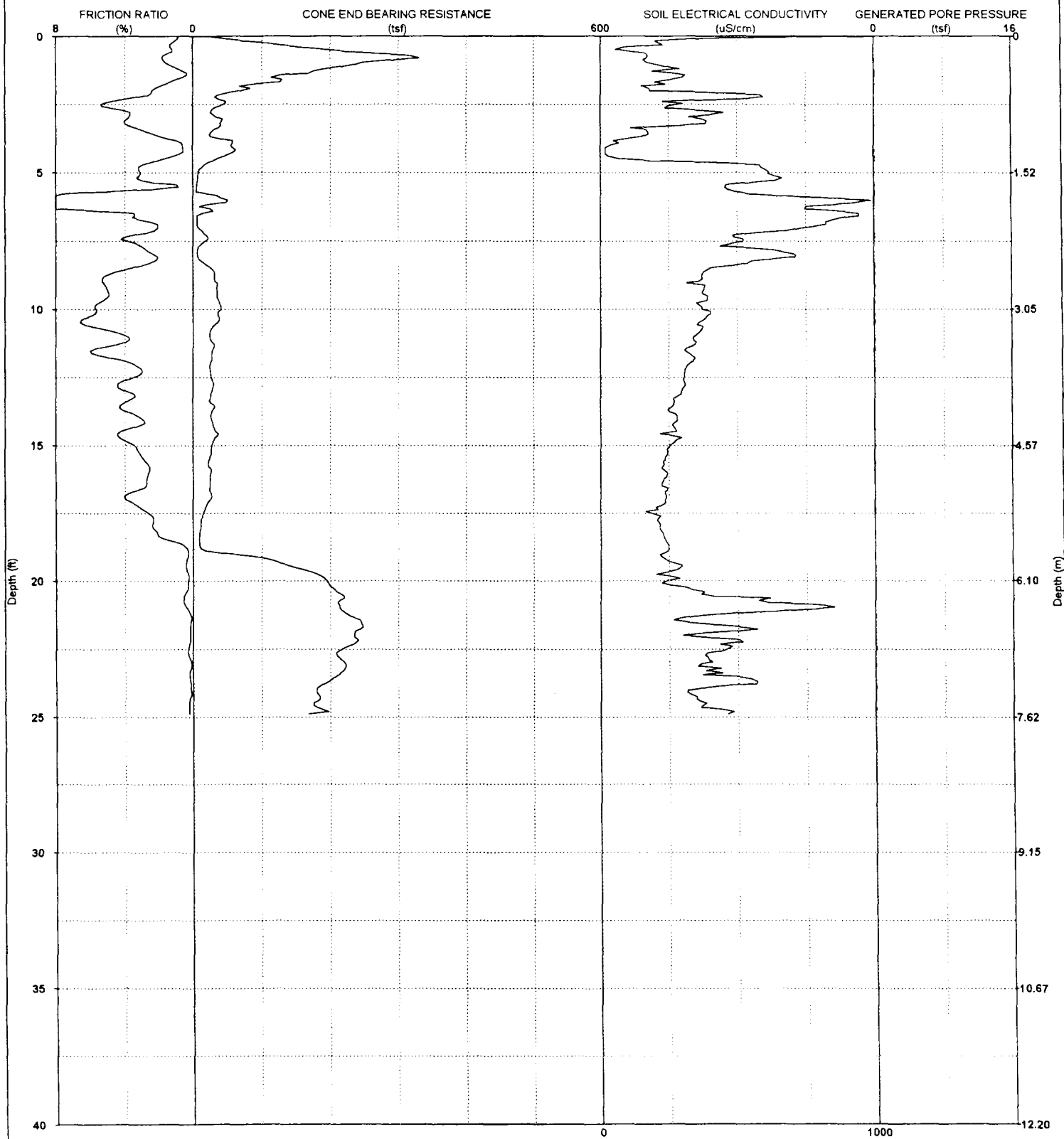
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:14:17:59.13

SOUNDING NUMBER:CP-006

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	253.2	407.9	3.61	1.6	0.0	150	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 62	+ 100
1.5	117.1	178.3	0.99	0.6	0.0	302	Medium dense, Sand to silty sand	42-46	40-60				26 - 39	40 - 60
2.0	69.8	101.9	2.49	2.4	0.0	181	Dense, Silty sand to sandy silt	37-40	60-80				27 - 41	40 - 60
2.5	43.9	62.0	2.41	5.3	0.0	289	Very stiff, Sandy clay to silty clay **			30	2.92	4.82	28 - 42	40 - 60
3.0	38.7	53.1	1.42	3.8	0.0	348	Very stiff, Sandy clay to silty clay *			25	3.08	2.84	15 - 22	20 - 30
3.5	26.6	35.6	1.10	2.8	-0.0	174	Very stiff, Sandy silt to sandy clay			25	2.11	2.20	07 - 11	10 - 15
4.0	55.3	72.4	0.32	0.6	-0.0	35	Medium dense, Sand to silty sand	40-42	40-60				08 - 11	10 - 15
4.5	33.7	43.3	0.91	1.7	0.1	93	Medium dense, Silty sand to sandy silt	27-31	40-60				08 - 12	10 - 15
5.0	7.2	9.0	0.51	3.1	0.0	616	Stiff, Silty clay to clay			10	1.37	1.03	00 - 02	00 - 02
5.5	5.1	6.3	-0.04	0.9	0.0	457	Firm, Sandy silt to clayey silt			10	0.95	-0.08	00 - 02	00 - 02
6.0	50.7	61.9	3.61	16.1	0.0	988	Hard, Silty clay to clay			18	5.59	7.22	+ 82	+ 100
6.5	11.0	13.3	0.78	3.5	-0.0	943	Stiff, Silty clay to clay *			15	1.42	1.56	03 - 05	04 - 06
7.0	7.0	8.3	0.31	2.1	0.0	751	Stiff, Clayey silt to silty clay			10	1.32	0.62	00 - 02	00 - 02
7.5	17.0	19.9	0.60	3.9	0.0	522	Stiff, Silty clay to clay *			20	1.65	1.20	05 - 09	06 - 10
8.0	6.0	6.9	0.29	2.3	-0.0	715	Stiff, Clayey silt to silty clay			10	1.10	0.58	00 - 02	00 - 02
8.5	26.0	29.8	1.13	3.7	0.0	401	Very stiff, Sandy clay to silty clay *			20	2.55	2.25	09 - 13	10 - 15
9.0	33.0	37.5	1.82	5.3	0.0	338	Very stiff, Silty clay to clay *			25	2.60	3.63	18 - 26	20 - 30
9.5	34.3	38.5	1.86	5.0	-0.0	387	Very stiff, Silty clay to clay *			25	2.70	3.71	18 - 27	20 - 30
10.0	41.0	45.5	2.13	5.7	0.0	372	Very stiff, Sandy clay to silty clay **			25	3.23	4.26	36 - 54	40 - 60
10.5	34.5	38.2	2.47	6.6	0.0	358	Very stiff, Sandy clay to silty clay **			25	2.71	4.84	36 - 54	40 - 60
11.0	23.8	26.1	1.05	3.9	-0.0	342	Very stiff, Silty clay to clay *			20	2.31	2.10	09 - 14	10 - 15
11.5	28.4	31.2	1.66	5.9	0.1	312	Very stiff, Silty clay to clay *			25	2.22	3.33	18 - 27	20 - 30
12.0	24.7	27.0	0.94	3.5	0.0	324	Very stiff, Sandy clay to silty clay *			20	2.40	1.88	09 - 14	10 - 15
12.5	26.2	28.5	0.95	3.5	0.0	308	Very stiff, Sandy clay to silty clay *			20	2.54	1.89	09 - 14	10 - 15
13.0	26.4	28.6	1.12	4.0	-0.0	297	Very stiff, Silty clay to clay *			20	2.56	2.24	14 - 18	15 - 20
13.5	29.5	31.8	1.17	4.2	0.0	289	Very stiff, Silty clay to clay *			25	2.30	2.34	14 - 19	15 - 20
14.0	26.1	28.0	0.87	3.0	-0.0	281	Very stiff, Sandy clay to silty clay *			20	2.53	1.74	09 - 14	10 - 15
14.5	33.5	35.8	1.38	4.3	0.0	263	Very stiff, Silty clay to clay *			25	2.61	2.78	19 - 28	20 - 30
15.0	26.7	28.4	1.07	3.4	-0.0	255	Very stiff, Sandy clay to silty clay *			20	2.58	2.14	09 - 14	10 - 15
15.5	23.4	24.8	0.75	2.9	0.0	238	Very stiff, Sandy clay to silty clay *			20	2.25	1.50	06 - 09	06 - 10
16.0	25.1	26.5	0.66	2.6	0.0	245	Very stiff, Sandy silt to sandy clay			20	2.41	1.32	06 - 09	06 - 10
16.5	23.8	25.1	0.67	2.8	0.0	229	Very stiff, Sandy clay to silty clay *			20	2.29	1.34	06 - 10	06 - 10
17.0	24.3	25.5	0.97	3.9	-0.0	236	Very stiff, Silty clay to clay *			20	2.33	1.93	10 - 14	10 - 15
17.5	14.3	15.0	0.48	2.6	0.0	185	Stiff, Clayey silt to silty clay			15	1.77	0.96	04 - 06	04 - 06
18.0	10.6	11.0	0.29	2.4	-0.0	215	Stiff, Clayey silt to silty clay			15	1.27	0.58	00 - 02	00 - 02
18.5	8.2	8.5	0.22	1.4	-0.0	237	Stiff, Sandy silt to clayey silt			10	1.43	0.44	00 - 02	00 - 02
19.0	53.3	55.0	0.31	0.3	-0.0	226	Loose, Sand to silty sand	37-40	20-40				06 - 10	06 - 10
19.5	146.7	151.0	0.74	0.4	0.0	294	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
20.0	195.0	199.9	0.64	0.3	0.0	242	Medium dense, Sand to silty sand	42-46	40-60				39 - 59	40 - 60
20.5	217.1	221.8	1.18	0.5	-0.0	376	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.0	214.8	218.8	0.81	0.4	-0.0	818	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60
21.5	245.0	248.7	0.37	0.1	-0.0	305	Medium dense, Sandy gravel to gravelly sand	+46	40-60				39 - 59	40 - 60
22.0	234.8	237.5	0.47	0.2	0.0	300	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 59	40 - 60
22.5	216.1	217.9	0.73	0.3	0.0	459	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.0	221.9	223.0	0.22	0.1	0.0	386	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.5	208.8	209.2	0.48	0.2	-0.0	477	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.0	180.1	179.9	0.40	0.2	0.0	317	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40
24.5	176.0	175.2	0.42	0.2	0.0	382	Medium dense, Sand to silty sand	42-46	40-60				30 - 40	30 - 40

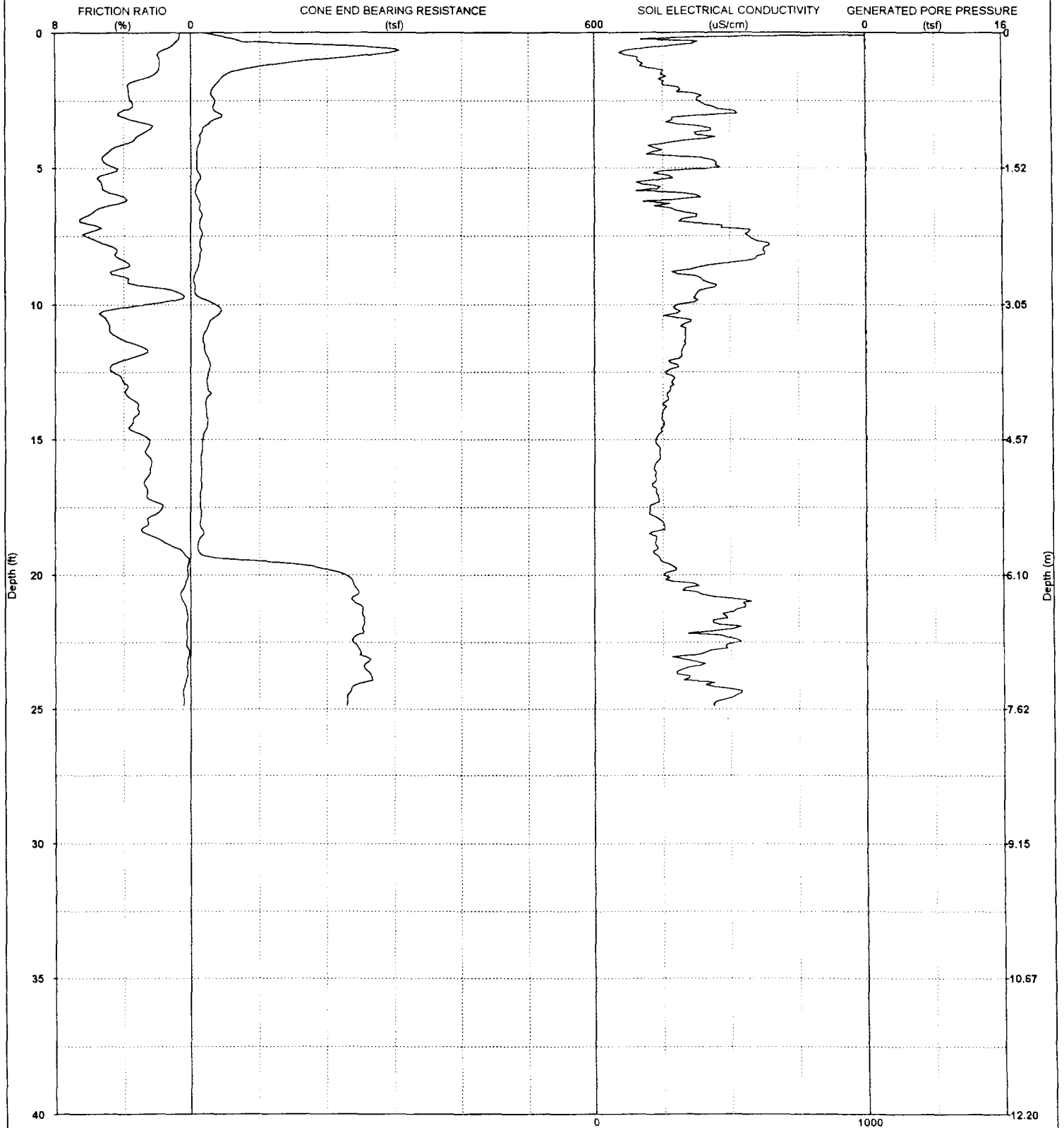
\* Indicates lightly overconsolidated soil

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# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:14:44:58.45

SOUNDING NUMBER:CP-007

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	173.3	279.2	5.20	1.9	-0.1	196	Very dense, Sandy gravel to silty gravelly sand	40-42	80-100				+ 62	+ 100
1.5	52.3	79.7	2.13	2.1	-0.0	245	Dense, Silty sand to sandy silt	36-37	60-80				13 - 20	20 - 30
2.0	33.3	48.6	1.57	3.7	-0.0	311	Very stiff, Sandy clay to silty clay *			25	2.65	3.14	14 - 21	20 - 30
2.5	34.7	49.0	1.25	3.6	-0.0	382	Very stiff, Sandy clay to silty clay *			25	2.77	2.50	14 - 21	20 - 30
3.0	43.1	59.1	1.59	4.3	0.0	465	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	2.86	3.18	29 - 44	40 - 60
3.5	18.4	24.6	0.73	2.3	-0.0	416	Stiff, Sandy silt to sandy clay			20	1.82	1.46	04 - 07	06 - 10
4.0	13.2	17.3	0.50	3.5	-0.0	308	Stiff, Silty clay to clay *			15	1.73	1.00	05 - 08	06 - 10
4.5	8.2	10.6	0.51	5.1	0.0	221	Stiff, Silty clay to clay *			15	1.06	1.01	03 - 05	04 - 06
5.0	8.1	10.2	0.50	4.5	0.0	433	Stiff, Silty clay to clay *			15	1.03	0.99	03 - 05	04 - 06
5.5	10.7	13.3	0.60	5.3	0.0	175	Stiff, Silty clay to clay *			15	1.38	1.20	05 - 08	06 - 10
6.0	7.7	9.4	0.47	4.3	-0.0	378	Firm, Silty clay to clay *			15	0.98	0.94	03 - 05	04 - 06
6.5	12.4	14.9	0.80	5.5	-0.0	286	Stiff, Silty clay to clay *			15	1.59	1.59	05 - 08	06 - 10
7.0	12.3	14.7	0.95	6.4	0.0	339	Stiff, Silty clay to clay *			14	1.70	1.89	08 - 13	10 - 15
7.5	16.1	18.9	0.92	6.2	0.0	566	Stiff, Silty clay to clay *			20	1.57	1.83	13 - 17	15 - 20
8.0	15.2	17.6	0.60	4.4	0.1	619	Stiff, Silty clay to clay *			15	1.96	1.20	05 - 09	06 - 10
8.5	11.1	12.7	0.47	3.7	-0.0	474	Stiff, Silty clay to clay *			15	1.41	0.93	03 - 05	04 - 06
9.0	4.5	5.1	0.30	3.9	0.0	386	Soft, Silty clay to clay			18	0.44	0.60	00 - 02	00 - 02
9.5	5.1	5.8	0.15	1.0	-0.0	389	Firm, Sandy silt to clayey silt			18	0.51	0.30	00 - 02	00 - 02
10.0	35.8	39.7	1.16	2.8	0.0	308	Very stiff, Sandy silt to sandy clay			25	2.81	2.32	14 - 18	15 - 20
10.5	32.2	35.6	1.99	5.1	-0.0	315	Very stiff, Silty clay to clay *			25	2.53	3.98	18 - 27	20 - 30
11.0	21.4	23.5	1.26	4.8	0.1	335	Very stiff, Silty clay to clay *			20	2.07	2.52	09 - 14	10 - 15
11.5	19.6	21.5	0.87	3.2	0.0	332	Stiff, Sandy clay to silty clay *			20	1.89	1.33	05 - 09	06 - 10
12.0	25.2	27.4	0.98	3.7	-0.0	310	Very stiff, Sandy clay to silty clay *			20	2.44	1.96	09 - 14	10 - 15
12.5	25.8	28.1	1.24	4.8	-0.0	263	Very stiff, Silty clay to clay *			20	2.51	2.49	14 - 18	15 - 20
13.0	24.0	26.0	0.92	3.8	0.0	286	Very stiff, Sandy clay to silty clay *			20	2.32	1.84	09 - 14	10 - 15
13.5	22.3	24.1	0.91	3.5	-0.0	272	Very stiff, Sandy clay to silty clay *			20	2.15	1.83	09 - 14	10 - 15
14.0	22.2	23.8	0.71	3.1	-0.0	246	Very stiff, Sandy clay to silty clay *			20	2.13	1.42	06 - 09	06 - 10
14.5	23.7	25.3	0.88	3.6	0.0	252	Very stiff, Sandy clay to silty clay *			20	2.28	1.77	09 - 14	10 - 15
15.0	17.3	18.4	0.49	2.5	0.0	224	Very stiff, Sandy clay to silty clay *			15	2.19	0.97	04 - 06	04 - 06
15.5	15.5	16.4	0.46	2.7	-0.0	237	Stiff, Sandy clay to silty clay *			15	1.95	0.91	04 - 06	04 - 06
16.0	15.6	16.5	0.36	2.4	-0.0	220	Stiff, Clayey silt to silty clay			15	1.95	0.72	04 - 06	04 - 06
16.5	15.0	15.8	0.42	2.7	-0.0	225	Stiff, Sandy clay to silty clay *			15	1.87	0.84	04 - 06	04 - 06
17.0	13.6	14.2	0.39	2.6	0.0	228	Stiff, Clayey silt to silty clay			15	1.68	0.79	04 - 06	04 - 06
17.5	13.7	14.3	0.25	1.7	0.0	203	Stiff, Sandy silt to clayey silt			15	1.68	0.50	00 - 02	00 - 02
18.0	14.4	15.0	0.41	2.6	-0.0	247	Stiff, Clayey silt to silty clay			15	1.78	0.82	04 - 06	04 - 06
18.5	18.4	19.1	0.40	2.5	-0.0	206	Very stiff, Sandy clay to silty clay *			15	2.30	0.80	04 - 06	04 - 06
19.0	10.0	10.3	0.22	0.8	0.0	231	Very loose, Silty sand to sandy silt	27-31	0-20				00 - 02	00 - 02
19.5	106.5	109.6	0.17	0.1	0.0	249	Medium dense, Sand to silty sand	40-42	40-60				15 - 19	15 - 20
20.0	228.8	234.6	0.37	0.2	-0.0	252	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60
20.5	243.9	249.3	1.08	0.5	0.0	330	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.0	240.5	244.9	1.15	0.5	-0.0	560	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.5	253.3	257.1	0.54	0.2	-0.0	481	Dense, Sandy gravel to gravelly sand	+46	60-80				39 - 59	40 - 60
22.0	252.2	255.1	0.62	0.3	-0.0	509	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 59	40 - 60
22.5	239.8	241.8	0.72	0.3	0.0	528	Dense, Sandy gravel to gravelly sand	42-46	60-80				40 - 60	40 - 60
23.0	254.0	255.3	0.40	0.2	-0.0	329	Medium dense, Sandy gravel to gravelly sand	+46	40-60				40 - 60	40 - 60
23.5	257.1	257.6	0.59	0.2	0.1	324	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
24.0	252.8	252.5	0.87	0.3	-0.0	440	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
24.5	230.0	229.0	1.06	0.4	-0.0	516	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60

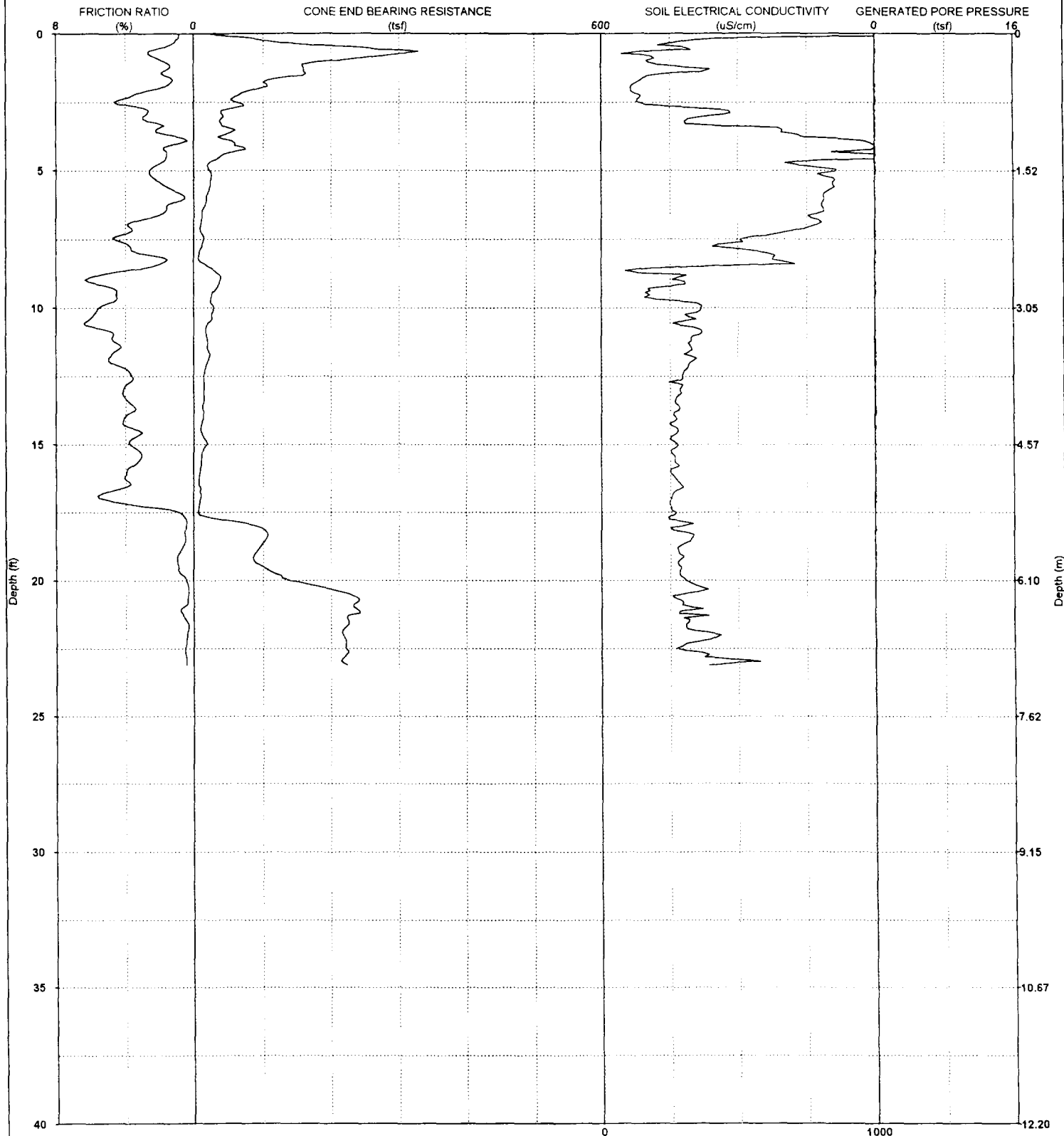
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# CPT-EC LOG





**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:15:18:08.84

SOUNDING NUMBER:CP-008

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	153.8	247.7	4.35	1.6	-0.0	82	Very dense, Sand to silty sand	42-46	80-100				37 - 61	60 - 99
1.5	159.8	243.3	3.08	1.8	0.0	185	Very dense, Sand to silty sand	40-42	80-100				+ 66	+ 100
2.0	92.5	135.1	2.31	2.1	0.0	106	Dense, Silty sand to sandy silt	37-40	60-80				27 - 41	40 - 60
2.5	63.1	89.1	3.33	4.6	0.1	136	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.19	6.66	42 - 70	60 - 99
3.0	42.8	58.8	1.51	2.9	0.0	399	Very stiff, Sandy silt to sandy clay			25	3.41	3.02	15 - 22	20 - 30
3.5	57.4	76.9	1.19	2.2	0.0	660	Dense, Silty sand to sandy silt	36-37	60-80				15 - 22	20 - 30
4.0	59.9	78.4	0.24	0.8	0.0	987	Medium dense, Sand to silty sand	40-42	40-60				11 - 15	15 - 20
4.5	37.0	47.5	0.97	1.6	0.0	1175	Medium dense, Silty sand to sandy silt	36-37	40-60				08 - 12	10 - 15
5.0	22.2	28.0	0.68	2.6	0.1	856	Very stiff, Sandy silt to sandy clay			20	2.19	1.35	05 - 08	06 - 10
5.5	23.7	29.4	0.46	1.9	0.0	846	Medium dense, Silty sand to sandy silt	27-31	40-60				05 - 08	06 - 10
6.0	18.2	22.2	0.08	0.5	0.0	816	Loose, Silty sand to sandy silt	31-36	20-40				02 - 03	02 - 04
6.5	11.3	13.6	0.25	1.7	0.0	807	Stiff, Sandy silt to clayey silt			15	1.45	0.51	00 - 02	00 - 02
7.0	10.1	12.0	0.45	3.9	0.0	777	Stiff, Silty clay to clay *			15	1.29	0.90	03 - 05	04 - 06
7.5	14.2	16.6	0.56	4.6	-0.0	517	Stiff, Silty clay to clay *			15	1.83	1.12	05 - 09	06 - 10
8.0	7.3	8.4	0.39	3.2	0.0	608	Stiff, Silty clay to clay *			10	1.35	0.78	00 - 02	00 - 02
8.5	21.5	24.6	0.82	2.6	0.0	322	Very stiff, Sandy silt to sandy clay			20	2.10	1.65	05 - 09	06 - 10
9.0	37.8	42.9	2.20	6.2	0.0	282	Very stiff, Sandy clay to silty clay **			25	2.98	4.41	35 - 53	40 - 60
9.5	25.5	28.6	1.49	4.5	0.0	171	Very stiff, Silty clay to clay *			20	2.49	2.98	13 - 18	15 - 20
10.0	28.6	31.7	1.50	5.6	0.0	366	Very stiff, Silty clay to clay *			25	2.24	3.00	18 - 27	20 - 30
10.5	22.9	25.4	1.64	6.3	0.0	287	Very stiff, Silty clay to clay *			20	2.23	3.27	18 - 27	20 - 30
11.0	18.2	20.0	0.92	4.7	0.0	346	Stiff, Silty clay to clay *			20	1.75	1.83	09 - 14	10 - 15
11.5	19.7	21.5	0.93	4.4	0.1	332	Stiff, Silty clay to clay *			20	1.90	1.85	09 - 14	10 - 15
12.0	19.3	21.1	1.04	4.8	0.1	323	Stiff, Silty clay to clay *			20	1.88	2.08	09 - 14	10 - 15
12.5	14.1	15.3	0.58	3.6	0.1	296	Stiff, Silty clay to clay *			15	1.78	1.15	04 - 06	04 - 06
13.0	14.3	15.4	0.59	4.1	0.1	287	Stiff, Silty clay to clay *			15	1.80	1.17	06 - 09	06 - 10
13.5	13.2	14.2	0.53	3.7	0.0	271	Stiff, Silty clay to clay *			15	1.65	1.06	04 - 06	04 - 06
14.0	13.8	14.8	0.53	4.0	0.0	272	Stiff, Silty clay to clay *			15	1.72	1.06	04 - 06	04 - 06
14.5	10.4	11.1	0.43	3.2	-0.0	279	Stiff, Silty clay to clay *			15	1.27	0.86	02 - 04	02 - 04
15.0	18.2	19.3	0.56	3.8	0.0	276	Very stiff, Silty clay to clay *			15	2.30	1.13	06 - 09	06 - 10
15.5	11.3	12.0	0.42	3.1	0.1	270	Stiff, Clayey silt to silty clay			15	1.38	0.83	02 - 04	02 - 04
16.0	8.8	9.3	0.40	3.9	0.0	250	Stiff, Silty clay to clay *			15	1.04	0.80	02 - 04	02 - 04
16.5	7.3	7.6	0.35	3.8	0.0	292	Stiff, Silty clay to clay *			10	1.25	0.70	00 - 02	00 - 02
17.0	9.7	10.1	0.51	5.3	0.1	254	Stiff, Silty clay to clay *			15	1.15	1.02	04 - 06	04 - 06
17.5	6.7	7.0	0.31	0.9	0.0	269	Stiff, Sandy silt to clayey silt			10	1.12	0.61	00 - 02	00 - 02
18.0	89.3	92.9	0.47	0.5	0.0	297	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
18.5	104.4	108.1	0.49	0.5	0.0	327	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
19.0	89.0	91.8	0.85	0.9	0.1	282	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
19.5	99.0	101.8	1.09	0.9	0.0	287	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
20.0	140.1	143.6	0.77	0.4	0.0	308	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
20.5	227.7	232.7	0.75	0.3	-0.0	288	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60
21.0	235.4	239.7	1.73	0.7	0.0	348	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
21.5	226.8	230.2	0.98	0.4	-0.0	319	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
22.0	217.9	220.4	0.91	0.4	0.0	434	Medium dense, Sand to silty sand	42-46	40-60				40 - 59	40 - 60
22.5	222.9	224.8	1.23	0.5	0.0	282	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60
23.0	216.9	218.0	0.83	0.4	-0.0	530	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60

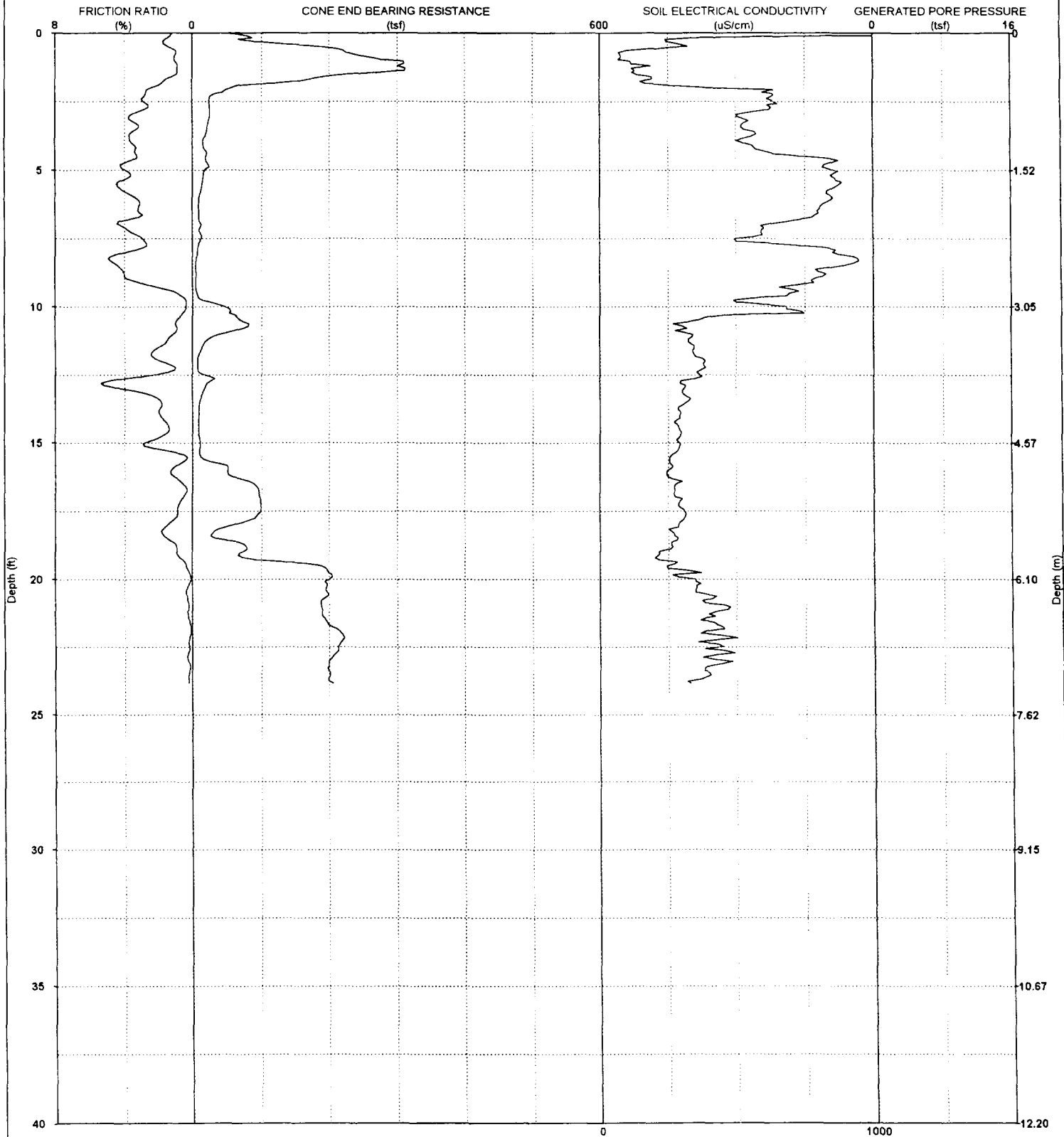
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# CPT-EC LOG



# STRATIGRAPHICS Evaluated Properties Using Global Database

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:15:47:06.08

SOUNDING NUMBER:CP-009

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	325.6	524.5	3.23	1.0	-0.3	6	Very dense, Sand to silty sand	+46	80-100				+ 62	+ 100
1.5	233.8	356.1	2.45	1.0	-0.1	132	Very dense, Sand to silty sand	42-46	80-100				39 - 65	60 - 99
2.0	56.5	82.5	3.45	2.4	-0.1	391	Dense, Silty sand to sandy silt	36-37	60-80				21 - 27	30 - 40
2.5	24.2	34.1	1.03	2.9	-0.1	639	Very stiff, Sandy silt to sandy clay			20	2.40	2.07	07 - 11	10 - 15
3.0	25.2	34.5	0.92	3.7	-0.0	504	Stiff, Sandy clay to silty clay *			25	2.00	1.84	11 - 15	15 - 20
3.5	21.4	28.6	0.74	3.3	-0.1	529	Very stiff, Sandy clay to silty clay *			20	2.11	1.49	07 - 11	10 - 15
4.0	15.2	19.9	0.66	3.6	-0.1	527	Stiff, Sandy clay to silty clay *			20	1.50	1.32	05 - 08	06 - 10
4.5	19.3	24.8	0.66	3.3	0.0	754	Stiff, Sandy clay to silty clay *			20	1.90	1.32	05 - 08	06 - 10
5.0	17.8	22.4	0.81	4.0	-0.1	858	Stiff, Silty clay to clay *			20	1.75	1.63	08 - 12	10 - 15
5.5	13.8	17.2	0.69	4.4	-0.0	878	Stiff, Silty clay to clay *			15	1.80	1.37	05 - 08	06 - 10
6.0	9.6	11.7	0.39	3.3	-0.1	654	Stiff, Silty clay to clay *			15	1.23	0.78	03 - 05	04 - 06
6.5	9.0	10.9	0.32	3.2	-0.1	797	Stiff, Silty clay to clay *			15	1.15	0.64	02 - 03	02 - 04
7.0	12.6	15.0	0.50	4.3	-0.1	608	Stiff, Silty clay to clay *			15	1.63	1.00	05 - 08	06 - 10
7.5	12.4	14.6	0.34	3.0	-0.0	512	Stiff, Sandy clay to silty clay *			15	1.60	0.68	03 - 05	04 - 06
8.0	6.9	8.0	0.34	3.9	-0.1	850	Stiff, Silty clay to clay			10	1.28	0.68	02 - 03	02 - 04
8.5	4.8	5.5	0.24	4.4	-0.1	884	Firm, Clay			10	0.85	0.49	00 - 02	00 - 02
9.0	4.9	5.5	0.19	3.7	-0.0	779	Firm, Silty clay to clay			10	0.87	0.38	00 - 02	00 - 02
9.5	6.2	7.0	0.19	0.9	-0.1	702	Stiff, Sandy silt to clayey silt			10	1.13	0.38	00 - 02	00 - 02
10.0	47.2	52.5	0.23	0.4	-0.1	683	Loose, Sand to silty sand	37-40	20-40				05 - 09	06 - 10
10.5	70.3	77.7	0.62	0.9	-0.0	355	Medium dense, Sand to silty sand	37-40	40-60				14 - 18	15 - 20
11.0	41.7	45.9	0.76	1.1	-0.1	330	Loose, Silty sand to sandy silt	36-37	20-40				05 - 09	06 - 10
11.5	13.6	14.9	0.45	2.0	-0.1	346	Stiff, Sandy silt to clayey silt			15	1.73	0.90	02 - 04	02 - 04
12.0	7.4	8.0	0.19	1.9	-0.1	387	Stiff, Clayey silt to silty clay			10	1.33	0.38	00 - 02	00 - 02
12.5	17.9	19.5	0.53	2.3	-0.1	368	Very stiff, Sandy silt to sandy clay			15	2.29	1.07	04 - 06	04 - 06
13.0	17.5	18.9	0.97	4.2	-0.1	308	Very stiff, Silty clay to clay *			15	2.22	1.94	06 - 09	06 - 10
13.5	10.0	10.7	0.25	1.9	-0.1	318	Stiff, Sandy silt to clayey silt			15	1.22	0.50	00 - 02	00 - 02
14.0	9.1	9.7	0.18	1.9	-0.0	292	Stiff, Clayey silt to silty clay			10	1.65	0.36	00 - 02	00 - 02
14.5	8.3	8.9	0.13	1.4	-0.0	291	Stiff, Sandy silt to clayey silt			10	1.50	0.27	00 - 02	00 - 02
15.0	11.3	12.0	0.31	2.8	-0.0	292	Stiff, Clayey silt to silty clay			15	1.38	0.63	02 - 04	02 - 04
15.5	11.7	12.4	0.08	0.4	-0.1	258	Very loose, Silty sand to sandy silt	31-36	0-20				00 - 02	00 - 02
16.0	51.0	53.8	0.83	1.3	-0.1	249	Medium dense, Silty sand to sandy silt	36-37	40-60				09 - 14	10 - 15
16.5	89.7	94.3	0.52	0.6	-0.1	278	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
17.0	98.0	102.7	0.58	0.6	-0.0	290	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
17.5	98.9	103.2	0.86	0.9	-0.1	310	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
18.0	60.1	62.5	1.26	1.5	-0.0	288	Medium dense, Silty sand to sandy silt	36-37	40-60				14 - 19	15 - 20
18.5	37.1	38.5	1.03	1.5	-0.1	286	Medium dense, Silty sand to sandy silt	36-37	40-60				06 - 10	06 - 10
19.0	71.2	73.5	0.97	0.9	-0.0	218	Medium dense, Sand to silty sand	37-40	40-60				15 - 19	15 - 20
19.5	185.1	190.5	0.78	0.4	-0.1	252	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
20.0	200.1	205.2	0.19	0.1	-0.1	350	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 39	30 - 40
20.5	198.2	202.5	0.77	0.4	-0.1	361	Medium dense, Sand to silty sand	42-46	40-60				39 - 59	40 - 60
21.0	188.6	192.0	0.47	0.3	-0.1	468	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 39	30 - 40
21.5	195.4	198.4	0.44	0.2	-0.1	375	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 39	30 - 40
22.0	219.0	221.5	0.26	0.1	-0.1	369	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 59	40 - 60
22.5	214.1	215.9	0.39	0.2	-0.1	435	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.0	200.2	201.2	0.63	0.3	-0.1	456	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.5	202.3	202.7	0.46	0.2	-0.1	405	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40

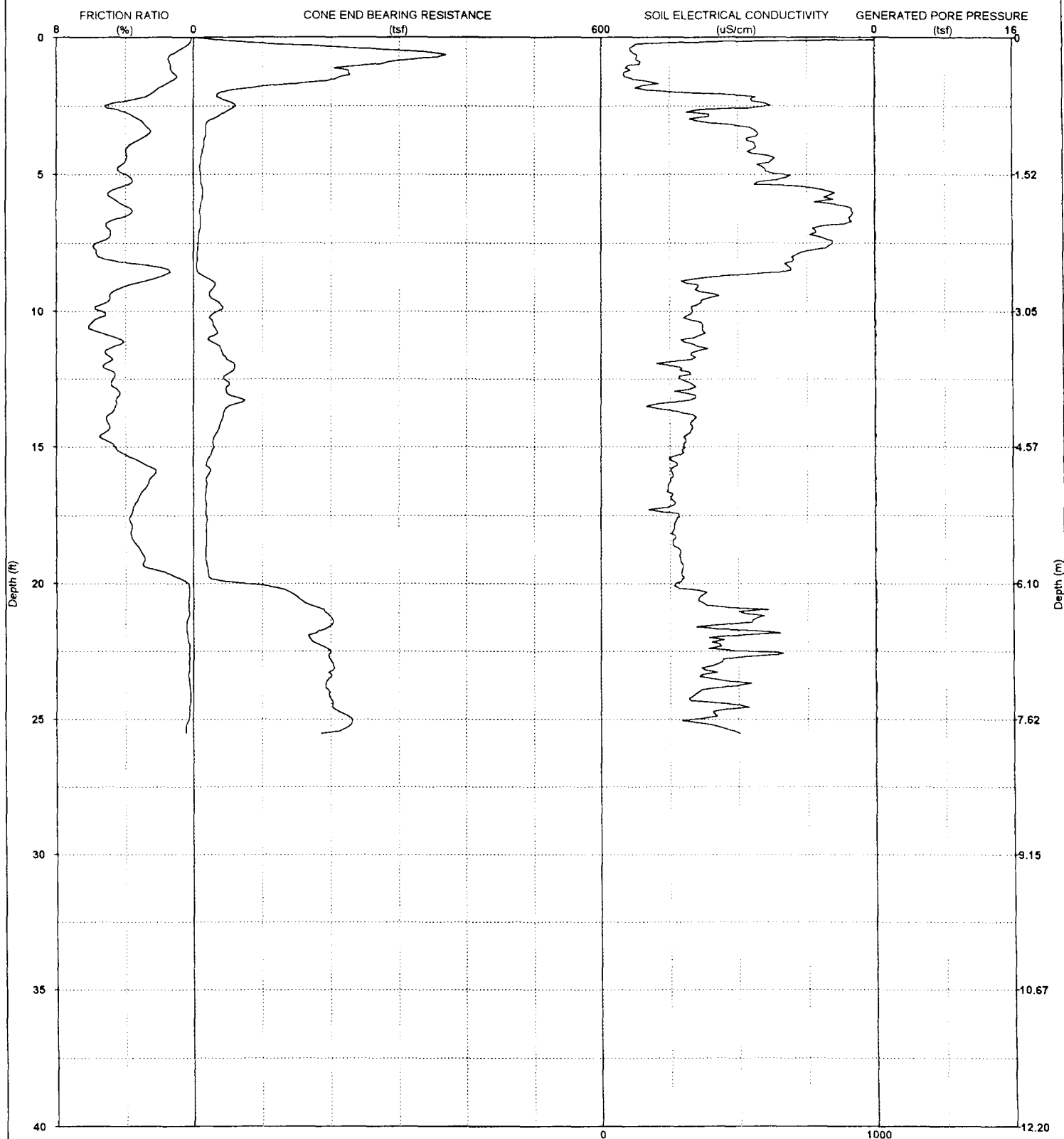
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:16:24:27.20

SOUNDING NUMBER:CP-010

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	174.6	281.3	3.51	1.4	0.1	64	Very dense, Sand to silty sand	42-46	80-100				37 - 61	60 - 99
1.5	207.8	316.5	2.30	1.1	0.1	108	Very dense, Sand to silty sand	42-46	80-100				39 - 65	60 - 99
2.0	40.3	58.8	2.80	2.4	0.0	271	Dense, Silty sand to sandy silt	27-31	60-80				14 - 21	20 - 30
2.5	60.1	84.9	2.56	5.1	0.0	605	Very stiff, Sandy clay to silty clay **			30	4.00	5.11	+ 71	+ 100
3.0	25.5	35.0	1.35	3.2	-0.0	336	Very stiff, Sandy clay to silty clay *			25	2.02	2.70	11 - 15	15 - 20
3.5	17.8	23.8	0.48	2.6	0.0	575	Stiff, Sandy silt to sandy clay			20	1.76	0.96	04 - 07	06 - 10
4.0	13.9	18.2	0.60	3.9	0.0	568	Stiff, Silty clay to clay *			15	1.82	1.20	05 - 08	06 - 10
4.5	9.8	12.6	0.47	4.0	0.0	623	Stiff, Silty clay to clay *			15	1.27	0.93	03 - 05	04 - 06
5.0	9.7	12.3	0.41	4.0	-0.0	662	Stiff, Silty clay to clay *			15	1.26	0.83	03 - 05	04 - 06
5.5	12.7	15.7	0.55	4.4	-0.0	768	Stiff, Silty clay to clay *			15	1.65	1.10	05 - 08	06 - 10
6.0	11.1	13.6	0.55	4.4	0.1	780	Stiff, Silty clay to clay *			15	1.44	1.10	03 - 05	04 - 06
6.5	9.2	11.1	0.38	3.9	0.0	913	Stiff, Silty clay to clay *			15	1.17	0.75	03 - 05	04 - 06
7.0	8.6	10.2	0.45	4.9	0.0	777	Stiff, Silty clay to clay *			15	1.08	0.90	03 - 05	04 - 06
7.5	6.3	7.4	0.41	5.7	0.0	846	Firm, Silty clay to clay *			12	0.98	0.81	03 - 05	04 - 06
8.0	5.4	6.3	0.30	5.5	0.0	697	Firm, Clay			12	0.82	0.60	02 - 03	02 - 04
8.5	5.2	5.9	0.23	1.4	0.1	685	Firm, Clayey silt to silty clay			10	0.93	0.46	00 - 02	00 - 02
9.0	31.3	35.5	0.96	3.6	-0.0	335	Very stiff, Sandy clay to silty clay *			25	2.46	1.92	13 - 18	15 - 20
9.5	24.4	27.4	1.76	4.9	0.0	401	Very stiff, Silty clay to clay *			20	2.38	3.51	13 - 18	15 - 20
10.0	34.9	38.7	1.92	5.3	0.0	334	Very stiff, Silty clay to clay *			25	2.74	3.84	18 - 27	20 - 30
10.5	28.7	31.8	1.82	6.1	0.0	371	Very stiff, Silty clay to clay *			25	2.25	3.63	18 - 27	20 - 30
11.0	21.0	23.1	1.43	4.4	0.0	315	Very stiff, Silty clay to clay *			20	2.03	2.87	09 - 14	10 - 15
11.5	41.4	45.3	2.63	5.2	0.0	337	Very stiff, Sandy clay to silty clay **			25	3.25	5.28	27 - 37	30 - 40
12.0	59.7	65.1	2.94	5.3	0.0	253	Very stiff, Sandy clay to silty clay **			30	3.93	5.88	55 - 91	60 - 99
12.5	45.0	48.8	2.48	4.7	0.1	291	Very stiff, Silty clay to clay *			25	3.54	4.95	28 - 37	30 - 40
13.0	48.3	52.2	2.59	4.3	0.0	292	Very stiff, Sandy clay to silty clay *			25	3.80	5.17	28 - 37	30 - 40
13.5	52.9	57.0	2.75	4.6	0.1	175	Very stiff, Sandy clay to silty clay **			30	3.47	5.50	37 - 56	40 - 60
14.0	42.0	45.1	2.32	5.1	-0.0	341	Very stiff, Sandy clay to silty clay **			25	3.30	4.64	28 - 37	30 - 40
14.5	33.2	35.4	1.98	5.3	0.0	322	Very stiff, Silty clay to clay *			25	2.58	3.98	19 - 28	20 - 30
15.0	29.0	30.8	1.37	4.6	-0.0	304	Very stiff, Silty clay to clay *			25	2.24	2.73	14 - 19	15 - 20
15.5	20.1	21.3	0.79	3.3	0.0	257	Stiff, Sandy clay to silty clay *			20	1.92	1.59	06 - 09	06 - 10
16.0	21.7	22.9	0.49	2.3	-0.0	262	Very stiff, Sandy silt to sandy clay			20	2.07	0.98	04 - 06	04 - 06
16.5	17.9	18.9	0.54	2.8	0.0	243	Very stiff, Sandy clay to silty clay *			15	2.26	1.08	04 - 06	04 - 06
17.0	17.4	18.3	0.62	3.4	0.1	266	Very stiff, Sandy clay to silty clay *			15	2.19	1.24	06 - 10	06 - 10
17.5	18.7	19.5	0.70	3.7	0.0	286	Stiff, Silty clay to clay *			20	1.77	1.41	06 - 10	06 - 10
18.0	18.6	19.4	0.69	3.6	0.0	266	Very stiff, Silty clay to clay *			15	2.34	1.38	06 - 10	06 - 10
18.5	18.6	19.2	0.65	3.5	0.0	261	Very stiff, Sandy clay to silty clay *			15	2.33	1.30	06 - 10	06 - 10
19.0	17.3	17.9	0.55	2.9	0.0	285	Very stiff, Sandy clay to silty clay *			15	2.15	1.10	04 - 06	04 - 06
19.5	20.7	21.3	0.70	2.3	0.0	296	Very stiff, Sandy silt to sandy clay			15	2.60	1.41	04 - 06	04 - 06
20.0	75.5	77.4	0.39	0.3	0.0	272	Loose, Sand to silty sand	40-42	20-40				10 - 15	10 - 15
20.5	151.5	154.8	0.48	0.3	0.0	359	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
21.0	191.2	194.7	0.56	0.3	0.1	557	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.5	203.0	206.1	0.80	0.4	-0.0	475	Medium dense, Sand to silty sand	42-46	40-60				39 - 59	40 - 60
22.0	169.6	171.6	0.70	0.4	-0.0	393	Medium dense, Sand to silty sand	42-46	40-60				30 - 40	30 - 40
22.5	199.6	201.2	0.56	0.3	0.1	529	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.0	204.5	205.6	0.52	0.3	0.0	416	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
23.5	198.5	198.8	0.58	0.3	-0.0	391	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.0	198.5	198.3	0.41	0.2	0.0	355	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40
24.5	202.8	201.9	0.55	0.3	0.0	513	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
25.0	231.5	229.8	0.59	0.3	0.1	331	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:16:24:27.20

SOUNDING NUMBER:CP-010

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N')
25.5	193.5	191.4	1.96	0.5	-0.0	502	Medium dense, Sand to silty sand	42-46	40-60				40 - 61	40 - 60

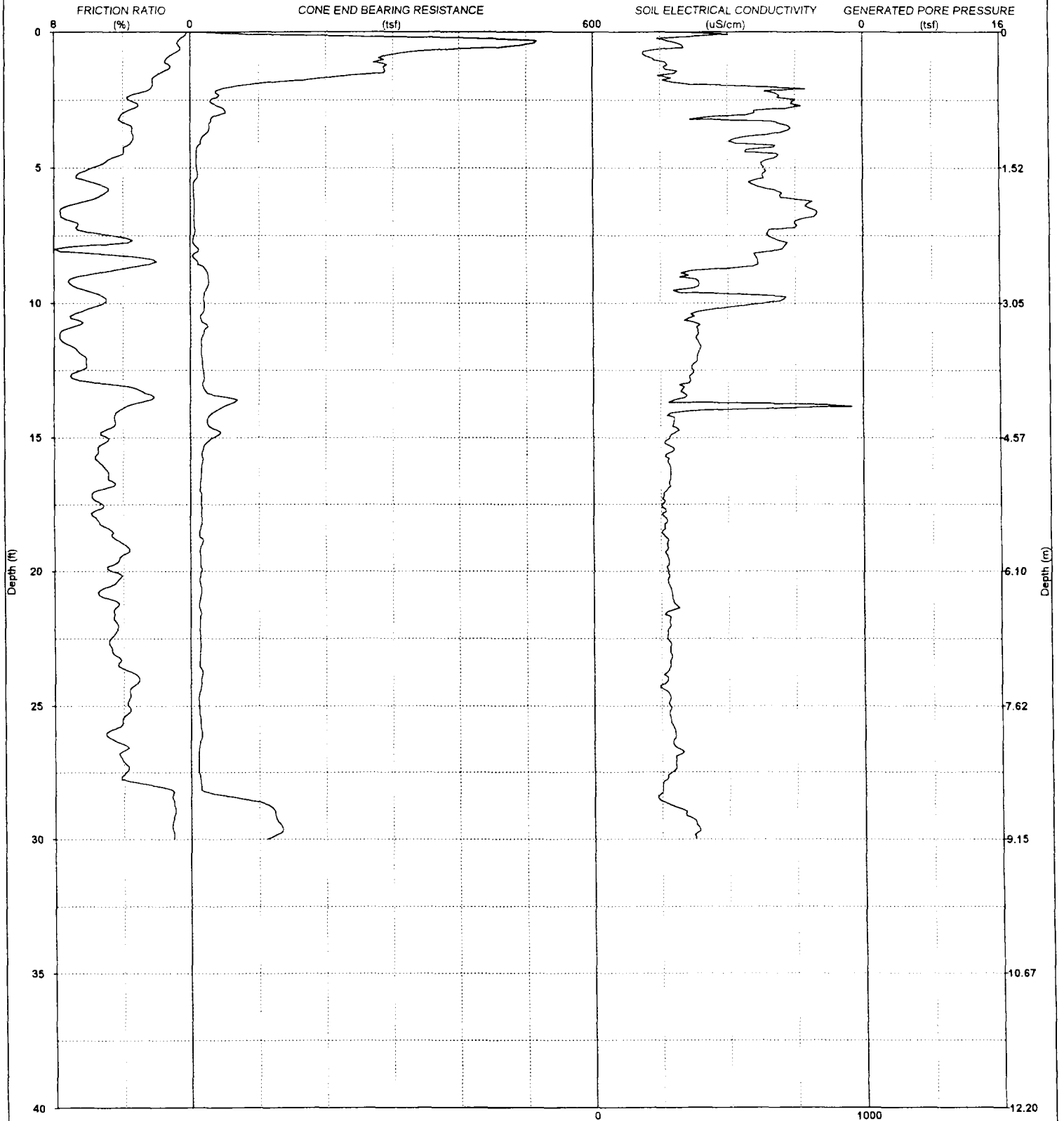
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:14:15:58.19

SOUNDING NUMBER:CP-010.5

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	240.6	387.7	5.22	1.9	0.0	261	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 62	+ 100
1.5	287.1	437.2	4.84	1.8	0.0	308	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 66	+ 100
2.0	63.2	92.3	3.81	2.3	0.0	600	Dense, Silty sand to sandy silt	37-40	60-80				21 - 27	30 - 40
2.5	30.2	42.7	1.55	3.6	0.0	750	Very stiff, Sandy clay to silty clay *			25	2.41	3.11	14 - 21	20 - 30
3.0	46.7	64.2	1.64	4.0	0.0	587	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	3.10	3.28	29 - 44	40 - 60
3.5	27.9	37.4	1.07	3.4	0.0	733	Very stiff, Sandy clay to silty clay *			25	2.22	2.14	11 - 15	15 - 20
4.0	14.9	19.5	0.75	3.5	0.0	506	Stiff, Sandy clay to silty clay *			15	1.96	1.50	05 - 08	06 - 10
4.5	8.3	10.7	0.43	4.1	0.0	689	Stiff, Silty clay to clay *			15	1.08	0.87	03 - 05	04 - 06
5.0	8.4	10.6	0.51	5.8	0.0	635	Stiff, Silty clay to clay *			15	1.09	1.02	05 - 08	06 - 10
5.5	5.3	6.6	0.52	6.0	0.0	585	Firm, Clay			12	0.83	1.05	03 - 05	04 - 06
6.0	4.5	5.5	0.26	5.2	0.0	694	Firm, Clay			10	0.83	0.52	00 - 02	00 - 02
6.5	5.3	6.4	0.39	7.6	0.0	810	Firm, Clay to organic soil			12	0.83	0.78	03 - 05	04 - 06
7.0	4.6	5.5	0.35	6.8	0.0	750	Firm, Clay			12	0.70	0.69	03 - 05	04 - 06
7.5	4.6	5.4	0.26	4.7	0.0	650	Firm, Clay			10	0.82	0.53	00 - 02	00 - 02
8.0	12.0	13.9	0.58	8.1	0.0	704	Stiff, Silty clay to clay *			14	1.65	1.16	09 - 13	10 - 15
8.5	10.5	12.1	0.39	2.1	0.0	613	Stiff, Clayey silt to silty clay			15	1.34	0.78	00 - 02	00 - 02
9.0	25.4	28.8	1.62	6.4	0.0	340	Stiff, Silty clay to clay *			25	1.99	3.23	18 - 26	20 - 30
9.5	22.2	24.9	1.58	6.4	0.0	318	Very stiff, Silty clay to clay *			20	2.16	3.16	18 - 27	20 - 30
10.0	20.2	22.4	1.02	5.1	0.0	637	Stiff, Silty clay to clay *			20	1.96	2.04	09 - 14	10 - 15
10.5	14.4	15.9	1.39	7.1	0.0	372	Stiff, Silty clay to clay *			14	1.97	2.78	09 - 14	10 - 15
11.0	19.9	21.9	1.44	7.5	0.0	390	Very stiff, Silty clay to clay *			18	2.14	2.88	18 - 27	20 - 30
11.5	15.0	16.5	1.28	7.4	0.0	394	Very stiff, Silty clay to clay *			14	2.05	2.51	14 - 18	15 - 20
12.0	16.4	17.9	1.05	6.2	0.0	387	Very stiff, Silty clay to clay *			15	2.09	2.10	09 - 14	10 - 15
12.5	18.2	19.7	1.21	6.4	0.0	372	Stiff, Silty clay to clay *			18	1.94	2.42	14 - 18	15 - 20
13.0	17.3	18.7	1.24	5.2	0.0	339	Stiff, Silty clay to clay *			20	1.65	2.47	09 - 14	10 - 15
13.5	48.9	52.7	1.08	2.2	0.0	341	Dense, Silty sand to sandy silt	27-31	60-80				14 - 19	15 - 20
14.0	37.0	39.7	2.26	4.2	0.0	362	Very stiff, Silty clay to clay *			25	2.90	4.52	19 - 28	20 - 30
14.5	25.0	26.7	1.53	4.5	0.0	297	Very stiff, Silty clay to clay *			20	2.41	3.06	14 - 19	15 - 20
15.0	32.7	34.7	1.66	4.9	0.0	283	Very stiff, Silty clay to clay *			25	2.54	3.32	19 - 28	20 - 30
15.5	17.3	18.3	1.22	5.4	0.0	294	Stiff, Silty clay to clay *			20	1.64	2.43	09 - 14	10 - 15
16.0	16.5	17.4	0.88	5.2	0.0	285	Very stiff, Silty clay to clay *			15	2.07	1.76	09 - 14	10 - 15
16.5	15.2	16.0	0.77	4.9	0.0	286	Stiff, Silty clay to clay *			15	1.89	1.54	06 - 10	06 - 10
17.0	13.6	14.2	0.86	5.6	0.0	269	Stiff, Silty clay to clay *			15	1.68	1.71	06 - 10	06 - 10
17.5	15.3	16.0	0.81	5.2	0.0	254	Stiff, Silty clay to clay *			15	1.90	1.63	06 - 10	06 - 10
18.0	16.8	17.5	0.89	5.6	0.0	270	Very stiff, Silty clay to clay *			15	2.10	1.78	10 - 14	10 - 15
18.5	13.4	13.9	0.69	4.6	0.0	257	Stiff, Silty clay to clay *			15	1.64	1.37	06 - 10	06 - 10
19.0	16.0	16.5	0.60	3.9	0.0	272	Stiff, Silty clay to clay *			15	1.98	1.19	06 - 10	06 - 10
19.5	13.8	14.2	0.60	4.2	0.0	277	Stiff, Silty clay to clay *			15	1.69	1.21	04 - 06	04 - 06
20.0	15.2	15.6	0.67	4.7	0.0	277	Stiff, Silty clay to clay *			15	1.87	1.34	06 - 10	06 - 10
20.5	14.1	14.5	0.68	4.6	0.0	281	Stiff, Silty clay to clay *			15	1.72	1.32	06 - 10	06 - 10
21.0	13.5	13.7	0.74	5.0	0.0	294	Stiff, Silty clay to clay *			15	1.63	1.48	06 - 10	06 - 10
21.5	14.4	14.6	0.60	4.6	0.0	276	Stiff, Silty clay to clay *			15	1.74	1.20	06 - 10	06 - 10
22.0	12.6	12.7	0.57	4.3	0.0	285	Stiff, Silty clay to clay *			15	1.50	1.14	04 - 06	04 - 06
22.5	13.6	13.7	0.65	4.7	0.0	274	Stiff, Silty clay to clay *			15	1.63	1.31	06 - 10	06 - 10
23.0	13.5	13.6	0.64	4.6	0.0	284	Stiff, Silty clay to clay *			15	1.62	1.28	06 - 10	06 - 10
23.5	11.8	11.9	0.64	4.3	0.0	285	Stiff, Silty clay to clay *			15	1.39	1.28	04 - 06	04 - 06
24.0	14.6	14.6	0.45	3.1	0.0	275	Stiff, Sandy clay to silty clay *			15	1.75	0.90	04 - 06	04 - 06
24.5	12.6	12.5	0.52	3.6	0.0	277	Stiff, Silty clay to clay *			15	1.48	1.04	04 - 06	04 - 06
25.0	11.7	11.6	0.46	3.7	0.0	283	Stiff, Silty clay to clay *			15	1.36	0.92	04 - 06	04 - 06

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:14:15:58.19

SOUNDING NUMBER:CP-010.5

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N')
25.5	13.3	13.1	0.57	4.1	0.0	283	Stiff, Silty clay to clay *			15	1.56	1.15	04 - 06	04 - 06
26.0	15.2	15.0	0.74	5.0	0.0	300	Stiff, Silty clay to clay *			15	1.82	1.48	06 - 10	06 - 10
26.5	12.2	12.0	0.52	3.8	0.0	301	Stiff, Silty clay to clay *			15	1.41	1.05	04 - 06	04 - 06
27.0	10.8	10.6	0.46	4.1	0.0	305	Stiff, Silty clay to clay *			15	1.23	0.92	04 - 06	04 - 06
27.5	11.4	11.1	0.49	3.9	0.0	290	Stiff, Silty clay to clay *			15	1.29	0.98	04 - 06	04 - 06
28.0	13.9	13.5	0.68	2.2	0.0	254	Stiff, Clayey silt to silty clay			15	1.63	1.36	02 - 04	02 - 04
28.5	76.4	74.2	1.15	1.1	0.0	240	Medium dense, Sand to silty sand	37-40	40-60				15 - 21	15 - 20
29.0	124.0	120.2	1.18	0.9	0.0	341	Medium dense, Sand to silty sand	40-42	40-60				21 - 31	20 - 30
29.5	133.5	129.1	1.49	1.1	0.0	383	Dense, Sand to silty sand	40-42	60-80				31 - 41	30 - 40
30.0	110.8	106.8	1.72	1.0	0.0	373	Medium dense, Sand to silty sand	40-42	40-60				21 - 31	20 - 30

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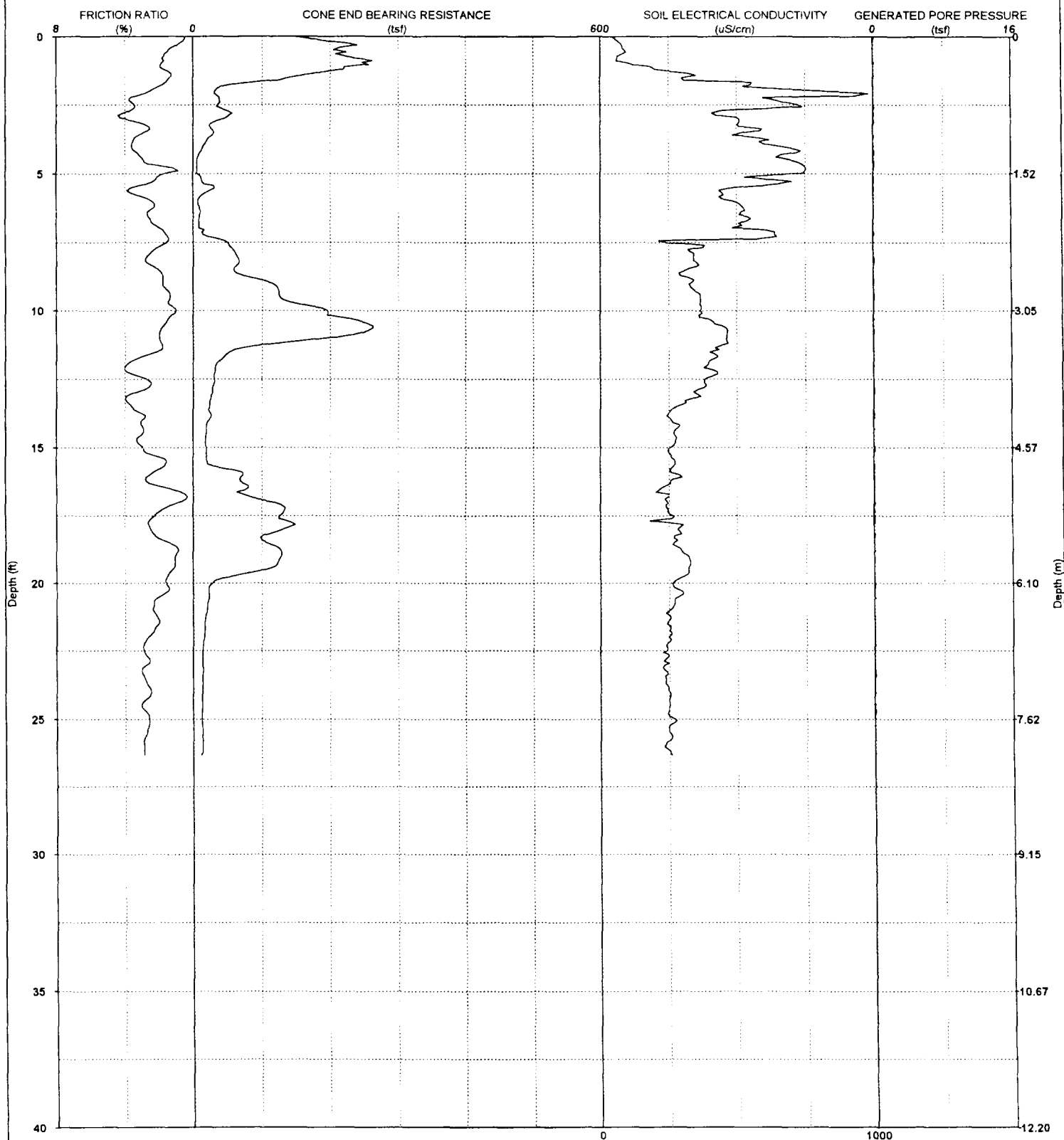
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:16:50:13.02

SOUNDING NUMBER:CP-011

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	222.3	358.1	6.04	2.2	0.0	174	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 62	+ 100
1.5	142.7	217.3	2.77	1.4	0.1	312	Dense, Sand to silty sand	42-46	60-80				39 - 65	60 - 99
2.0	31.3	45.7	1.89	2.5	0.0	826	Very stiff, Sandy silt to sandy clay			25	2.49	3.78	10 - 14	15 - 20
2.5	35.3	49.8	1.56	3.4	0.0	727	Very stiff, Sandy clay to silty clay *			25	2.81	3.12	14 - 21	20 - 30
3.0	43.5	59.7	1.88	4.1	0.0	505	Very stiff, Sandy clay to silty clay *			25	3.47	3.77	22 - 29	30 - 40
3.5	30.0	40.2	0.84	2.9	0.0	538	Very stiff, Sandy silt to sandy clay			25	2.39	1.69	11 - 15	15 - 20
4.0	14.3	18.7	0.78	3.6	0.0	653	Stiff, Silty clay to clay *			15	1.88	1.56	05 - 08	06 - 10
4.5	4.7	6.1	0.26	2.9	0.0	696	Firm, Silty clay to clay			10	0.89	0.51	00 - 02	00 - 02
5.0	6.6	8.3	0.28	1.7	0.0	707	Stiff, Clayey silt to silty clay			10	1.26	0.57	00 - 02	00 - 02
5.5	30.5	37.8	0.68	3.6	0.0	511	Very stiff, Sandy clay to silty clay *			25	2.41	1.35	12 - 16	15 - 20
6.0	6.1	7.4	0.37	2.4	0.0	490	Stiff, Clayey silt to silty clay			10	1.14	0.74	00 - 02	00 - 02
6.5	8.4	10.1	0.24	2.7	-0.0	519	Stiff, Clayey silt to silty clay			15	1.07	0.49	00 - 02	00 - 02
7.0	12.5	14.8	0.46	1.9	0.0	547	Stiff, Sandy silt to clayey silt			15	1.61	0.92	02 - 03	02 - 04
7.5	49.7	58.4	0.86	1.6	-0.0	236	Medium dense, Silty sand to sandy silt	36-37	40-60				13 - 17	15 - 20
8.0	63.5	73.7	1.72	2.7	0.0	342	Hard, Sandy silt to sandy clay			25	5.04	3.44	26 - 35	30 - 40
8.5	59.7	68.5	1.62	2.0	0.0	317	Dense, Silty sand to sandy silt	36-37	60-80				17 - 26	20 - 30
9.0	114.7	130.0	2.23	1.8	0.0	331	Dense, Silty sand to sandy silt	37-40	60-80				35 - 53	40 - 60
9.5	126.3	141.7	2.12	1.4	0.1	367	Dense, Sand to silty sand	40-42	60-80				36 - 53	40 - 60
10.0	195.8	217.5	2.08	1.0	0.0	366	Dense, Sand to silty sand	42-46	60-80				36 - 54	40 - 60
10.5	258.3	285.6	4.10	1.7	-0.0	427	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 90	+ 100
11.0	198.5	218.5	4.89	2.0	0.0	463	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+ 91	+ 100
11.5	54.4	59.6	2.24	2.1	-0.0	411	Dense, Silty sand to sandy silt	36-37	60-80				14 - 18	15 - 20
12.0	32.8	35.7	1.69	3.9	0.1	393	Very stiff, Sandy clay to silty clay *			25	2.56	3.38	14 - 18	15 - 20
12.5	30.9	33.5	0.84	2.7	0.0	383	Very stiff, Sandy silt to sandy clay			20	3.01	1.88	09 - 14	10 - 15
13.0	27.5	29.7	1.01	3.5	0.0	348	Very stiff, Sandy clay to silty clay *			20	2.67	2.03	09 - 14	10 - 15
13.5	23.3	25.1	0.88	3.6	-0.0	278	Very stiff, Sandy clay to silty clay *			20	2.25	1.78	09 - 14	10 - 15
14.0	22.4	24.0	0.74	3.0	-0.0	260	Very stiff, Sandy clay to silty clay *			20	2.15	1.48	06 - 09	06 - 10
14.5	18.5	19.7	0.57	3.0	-0.0	269	Very stiff, Sandy clay to silty clay *			15	2.35	1.14	06 - 09	06 - 10
15.0	18.5	19.6	0.55	3.0	0.1	256	Very stiff, Sandy clay to silty clay *			15	2.34	1.10	06 - 09	06 - 10
15.5	19.6	20.8	0.68	1.6	0.0	273	Loose, Silty sand to sandy silt	27-31	20-40				04 - 06	04 - 06
16.0	72.6	76.6	1.84	2.5	0.0	289	Dense, Silty sand to sandy silt	36-37	60-80				28 - 38	30 - 40
16.5	78.9	83.0	1.08	1.5	0.0	219	Medium dense, Silty sand to sandy silt	37-40	40-60				19 - 29	20 - 30
17.0	114.9	120.4	1.09	0.9	0.0	243	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
17.5	126.4	131.9	3.10	2.3	0.0	266	Very dense, Silty sand to sandy silt	37-40	80-100				38 - 57	40 - 60
18.0	131.1	136.3	3.48	2.5	-0.0	282	Very dense, Silty sand to sandy silt	37-40	80-100				58 - 95	60 - 99
18.5	107.9	111.8	1.68	1.4	0.0	267	Dense, Sand to silty sand	40-42	60-80				29 - 39	30 - 40
19.0	128.5	132.7	1.35	1.1	0.0	322	Medium dense, Sand to silty sand	40-42	40-60				29 - 39	30 - 40
19.5	105.8	108.9	1.47	1.2	0.0	322	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
20.0	27.9	28.6	0.96	1.6	0.0	263	Loose, Silty sand to sandy silt	27-31	20-40				06 - 10	06 - 10
20.5	22.7	23.2	0.47	2.0	0.0	284	Very stiff, Sandy silt to sandy clay			20	2.15	0.94	04 - 06	04 - 06
21.0	20.0	20.4	0.51	2.4	-0.0	255	Very stiff, Sandy silt to sandy clay			15	2.50	1.03	04 - 06	04 - 06
21.5	16.7	17.0	0.36	2.0	-0.0	243	Very stiff, Sandy silt to clayey silt			15	2.06	0.72	04 - 06	04 - 06
22.0	15.2	15.4	0.43	2.6	-0.0	247	Stiff, Sandy clay to silty clay *			15	1.85	0.86	04 - 06	04 - 06
22.5	13.7	13.8	0.42	2.9	-0.0	241	Stiff, Sandy clay to silty clay *			15	1.65	0.83	04 - 06	04 - 06
23.0	13.5	13.6	0.38	2.7	0.0	241	Stiff, Clayey silt to silty clay			15	1.61	0.75	04 - 06	04 - 06
23.5	13.4	13.4	0.39	2.9	0.0	236	Stiff, Clayey silt to silty clay			15	1.60	0.79	04 - 06	04 - 06
24.0	12.5	12.5	0.32	2.5	0.0	250	Stiff, Clayey silt to silty clay			15	1.47	0.64	02 - 04	02 - 04
24.5	13.3	13.3	0.39	3.0	0.0	252	Stiff, Sandy clay to silty clay *			15	1.58	0.78	04 - 06	04 - 06
25.0	11.9	11.8	0.33	2.6	0.0	272	Stiff, Clayey silt to silty clay			15	1.38	0.66	02 - 04	02 - 04

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:16:50:13.02

SOUNDING NUMBER:CP-011

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	13.1	13.0	0.35	2.7	-0.0	252	Stiff, Clayey silt to silty clay			15	1.55	0.71	02 - 04	02 - 04
26.0	13.3	13.1	0.38	2.9	-0.0	231	Stiff, Clayey silt to silty clay			15	1.56	0.76	04 - 06	04 - 06

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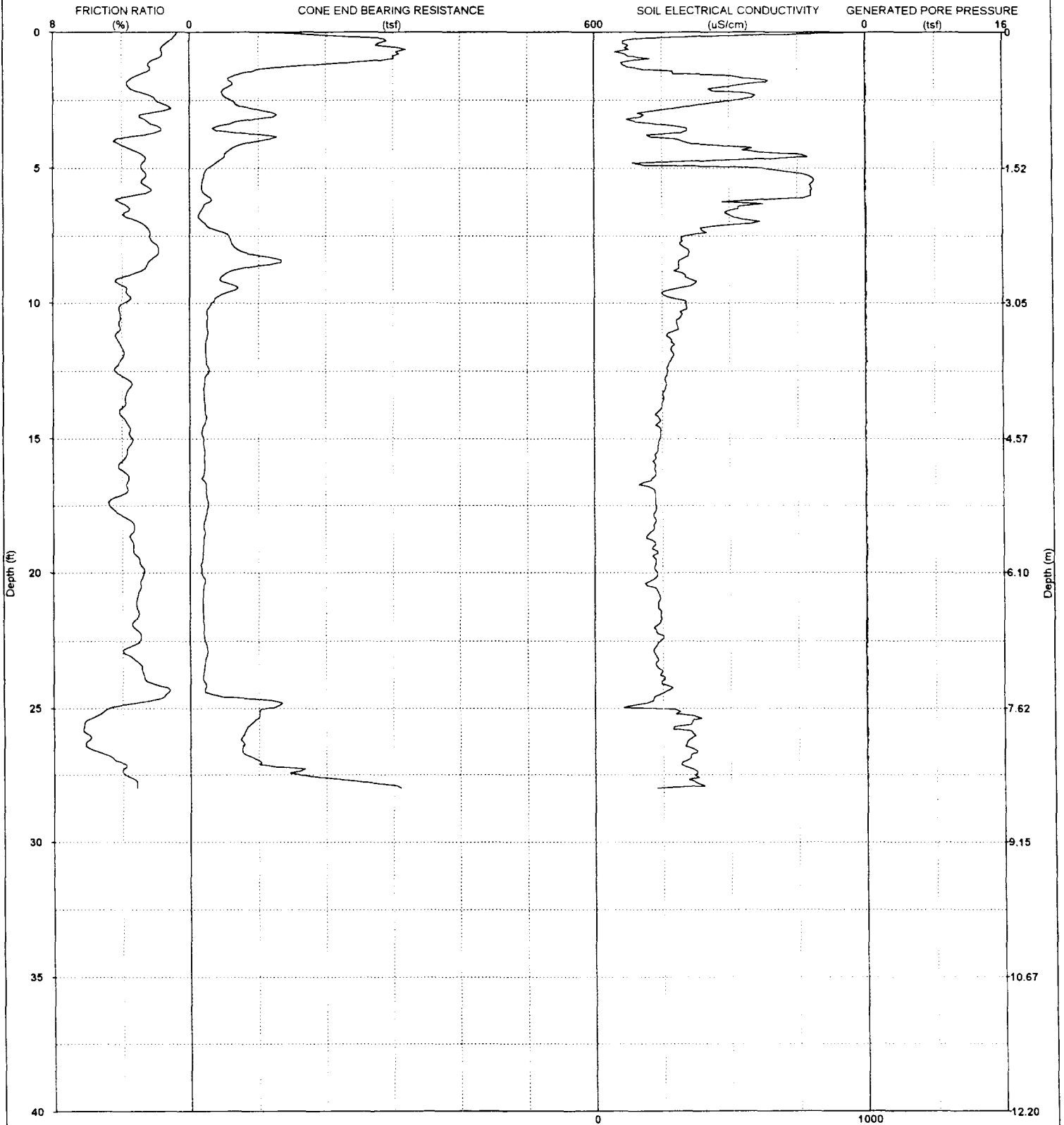
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:17:18:42.08

SOUNDING NUMBER:CP-012

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	311.0	500.9	9.63	2.3	0.0	89	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 62	+ 100
1.5	79.0	120.3	4.52	2.7	0.0	292	Very dense, Silty sand to sandy silt	36-37	80-100				26 - 39	40 - 60
2.0	56.6	82.6	2.32	3.6	0.1	499	Very stiff, Gravelly clayey sand to gravelly sandy silt			30	3.76	4.64	27 - 41	40 - 60
2.5	60.3	85.1	1.74	2.0	0.0	521	Dense, Silty sand to sandy silt	37-40	60-80				14 - 21	20 - 30
3.0	125.6	172.3	2.72	2.6	0.0	175	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 73	+ 100
3.5	35.7	47.8	1.29	1.7	0.0	334	Medium dense, Silty sand to sandy silt	36-37	40-60				07 - 11	10 - 15
4.0	97.3	127.5	3.87	4.5	0.1	329	Hard, Gravelly sandy clay to gravelly silty clay **			33	5.88	7.74	+ 76	+ 100
4.5	50.2	64.4	1.80	2.8	0.0	771	Very stiff, Sandy silt to sandy clay			25	3.99	3.59	16 - 23	20 - 30
5.0	26.3	33.2	1.12	2.8	0.0	614	Very stiff, Sandy silt to sandy clay			20	2.60	2.24	08 - 12	10 - 15
5.5	18.4	22.8	0.62	2.8	0.0	808	Stiff, Sandy clay to silty clay *			20	1.80	1.23	05 - 08	06 - 10
6.0	25.0	30.5	0.77	3.3	0.0	801	Very stiff, Sandy clay to silty clay *			20	2.46	1.54	08 - 12	10 - 15
6.5	17.6	21.2	0.86	3.5	0.1	523	Stiff, Sandy clay to silty clay *			20	1.72	1.73	05 - 08	06 - 10
7.0	20.5	24.4	1.05	2.9	0.1	598	Very stiff, Sandy clay to silty clay *			20	2.01	2.09	05 - 08	06 - 10
7.5	56.9	66.8	1.43	2.3	0.1	339	Dense, Silty sand to sandy silt	36-37	60-80				17 - 26	20 - 30
8.0	69.1	80.1	1.94	1.8	0.0	348	Dense, Silty sand to sandy silt	37-40	60-80				17 - 26	20 - 30
8.5	129.8	148.8	2.59	2.5	0.0	312	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				52 - 86	60 - 99
9.0	46.7	53.0	2.89	3.8	0.0	338	Very stiff, Sandy clay to silty clay *			25	3.70	5.79	18 - 26	20 - 30
9.5	66.4	74.5	2.06	3.7	0.0	288	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.39	4.13	36 - 53	40 - 60
10.0	32.2	35.7	1.74	3.9	0.0	342	Very stiff, Sandy clay to silty clay *			25	2.53	3.48	14 - 18	15 - 20
10.5	25.8	28.5	1.10	4.1	0.1	321	Very stiff, Silty clay to clay *			20	2.51	2.21	14 - 18	15 - 20
11.0	25.5	28.1	1.02	4.1	0.0	302	Very stiff, Silty clay to clay *			20	2.49	2.05	14 - 18	15 - 20
11.5	22.5	24.7	1.01	4.1	0.0	294	Very stiff, Silty clay to clay *			20	2.19	2.02	09 - 14	10 - 15
12.0	23.3	25.4	0.98	4.0	0.1	287	Very stiff, Silty clay to clay *			20	2.26	1.96	09 - 14	10 - 15
12.5	27.9	30.4	1.11	4.4	0.0	272	Very stiff, Silty clay to clay *			25	2.18	2.22	14 - 18	15 - 20
13.0	21.3	23.0	0.78	3.4	0.0	266	Very stiff, Sandy clay to silty clay *			20	2.05	1.57	06 - 09	06 - 10
13.5	20.4	22.0	0.81	3.8	0.0	256	Stiff, Silty clay to clay *			20	1.96	1.63	06 - 09	06 - 10
14.0	22.2	23.8	0.94	4.2	0.1	233	Very stiff, Silty clay to clay *			20	2.13	1.88	09 - 14	10 - 15
14.5	19.8	21.1	0.80	3.6	0.0	230	Stiff, Sandy clay to silty clay *			20	1.89	1.61	06 - 09	06 - 10
15.0	20.3	21.6	0.68	3.4	0.0	242	Stiff, Sandy clay to silty clay *			20	1.94	1.35	06 - 09	06 - 10
15.5	21.8	23.1	0.78	3.7	0.0	231	Very stiff, Sandy clay to silty clay *			20	2.09	1.56	09 - 14	10 - 15
16.0	21.5	22.7	0.92	4.2	0.0	225	Very stiff, Silty clay to clay *			20	2.05	1.84	09 - 14	10 - 15
16.5	17.7	18.6	0.78	3.6	0.0	210	Very stiff, Silty clay to clay *			15	2.23	1.55	06 - 10	06 - 10
17.0	23.1	24.3	0.91	3.7	0.0	224	Very stiff, Sandy clay to silty clay *			20	2.21	1.82	10 - 14	10 - 15
17.5	26.5	27.7	1.19	4.7	0.0	226	Very stiff, Silty clay to clay *			20	2.55	2.39	14 - 19	15 - 20
18.0	22.1	23.0	0.88	3.7	0.0	225	Very stiff, Sandy clay to silty clay *			20	2.11	1.76	06 - 10	06 - 10
18.5	21.3	22.1	0.68	3.4	0.0	205	Very stiff, Sandy clay to silty clay *			20	2.02	1.37	06 - 10	06 - 10
19.0	18.8	19.4	0.66	3.3	0.1	218	Very stiff, Sandy clay to silty clay *			15	2.36	1.32	06 - 10	06 - 10
19.5	18.2	18.8	0.55	3.0	0.0	224	Very stiff, Sandy clay to silty clay *			15	2.28	1.09	04 - 06	04 - 06
20.0	16.5	17.0	0.54	2.7	0.0	231	Very stiff, Sandy clay to silty clay *			15	2.05	1.08	04 - 06	04 - 06
20.5	19.3	19.7	0.56	2.9	0.0	201	Very stiff, Sandy clay to silty clay *			15	2.41	1.13	06 - 10	06 - 10
21.0	18.2	18.6	0.59	3.2	0.1	239	Very stiff, Sandy clay to silty clay *			15	2.26	1.18	06 - 10	06 - 10
21.5	18.0	18.2	0.57	3.0	0.0	243	Very stiff, Sandy clay to silty clay *			15	2.23	1.15	04 - 06	04 - 06
22.0	19.9	20.2	0.67	3.3	0.1	218	Stiff, Sandy clay to silty clay *			20	1.86	1.34	06 - 10	06 - 10
22.5	21.7	21.9	0.69	2.9	0.0	239	Very stiff, Sandy clay to silty clay *			20	2.04	1.38	06 - 10	06 - 10
23.0	24.3	24.4	0.88	3.7	0.0	223	Very stiff, Sandy clay to silty clay *			20	2.29	1.75	10 - 15	10 - 15
23.5	20.0	20.0	0.61	2.8	0.0	233	Very stiff, Sandy clay to silty clay *			15	2.48	1.22	06 - 10	06 - 10
24.0	19.6	19.6	0.60	2.6	0.0	243	Very stiff, Sandy clay to silty clay *			15	2.42	1.20	04 - 06	04 - 06
24.5	35.7	35.6	1.51	1.5	0.0	234	Medium dense, Silty sand to sandy silt	27-31	40-60				06 - 10	06 - 10
25.0	113.0	112.1	5.17	4.8	0.0	200	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.76	10.34	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-21-2002 TIME:17:18:42.08

SOUNDING NUMBER:CP-012

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	92.1	91.2	6.24	6.2	0.0	359	Hard, Sandy clay to silty clay **			30	6.04	12.47	+ 101	+ 100
26.0	77.6	76.5	4.79	5.9	0.0	370	Hard, Sandy clay to silty clay **			30	5.07	9.58	+ 101	+ 100
26.5	75.7	74.4	5.01	5.9	0.0	362	Hard, Sandy clay to silty clay **			30	4.94	10.02	+ 102	+ 100
27.0	102.1	100.1	5.89	4.2	0.0	328	Hard, Gravelly sandy clay to gravelly silty clay **			30	6.70	11.77	61 - 101	60 - 99
27.5	158.8	155.3	9.43	3.8	0.0	370	Hard, Gravelly clayey sand to gravelly sandy silt			33	9.53	18.86	+ 102	+ 100
28.0	311.1	303.3	10.21	3.1	0.0	226	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 103	+ 100

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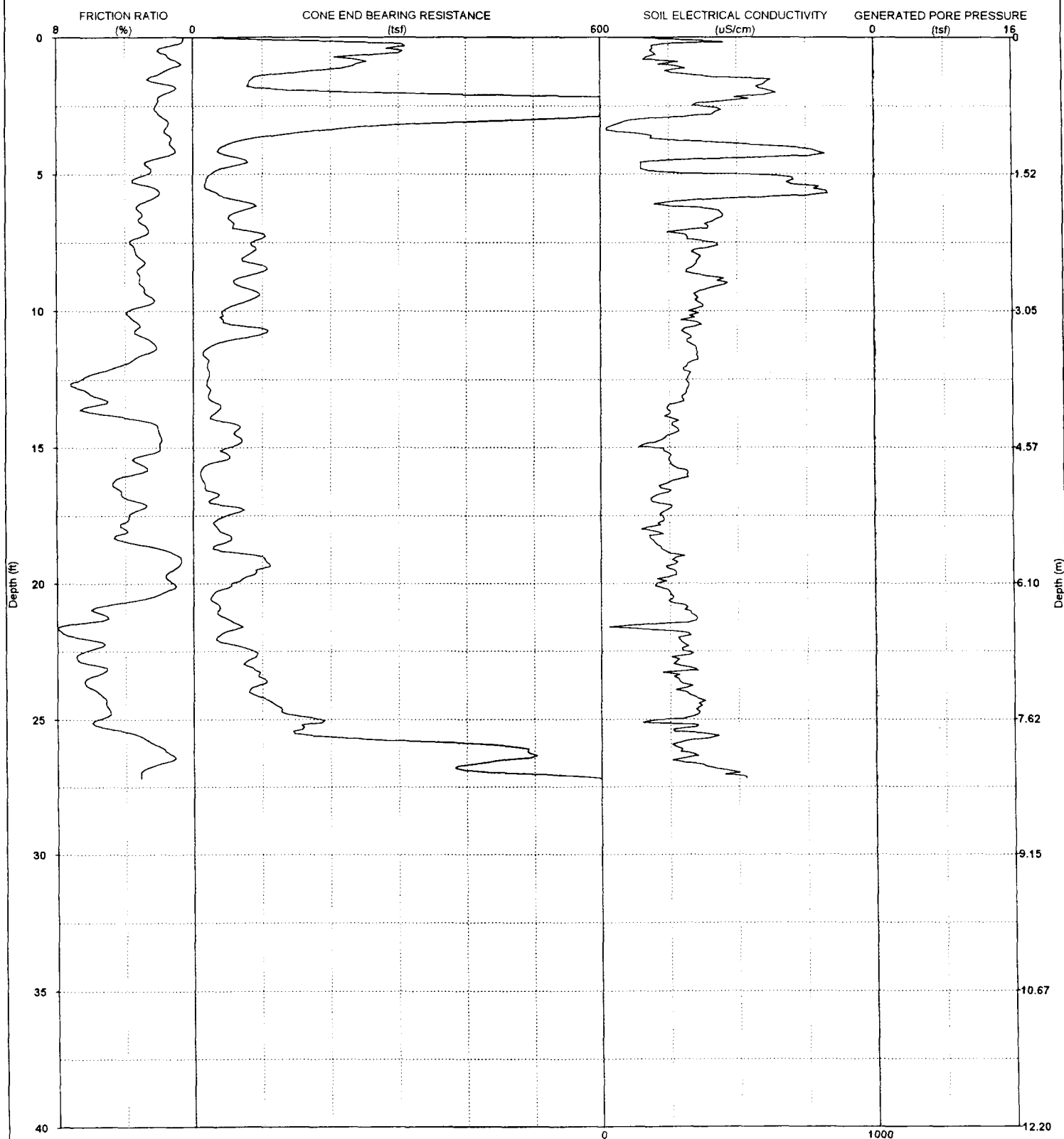
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# CPT-EC LOG





**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:07:30:52.12

SOUNDING NUMBER:CP-013A

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	270.3	435.4	2.04	0.8	0.0	423	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 62	+ 100
1.5	85.7	130.5	4.42	2.7	0.0	571	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				39 - 65	60 - 99
2.0	227.7	332.5	8.19	1.4	0.0	644	Very dense, Sand to silty sand	42-46	80-100				+ 68	+ 100
2.5	783.3	1106.0	15.64	2.2	0.0	363	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 71	+ 100
3.0	494.8	679.0	10.18	1.6	0.1	127	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 73	+ 100
3.5	149.1	199.6	4.78	1.6	0.0	125	Dense, Sand to silty sand	40-42	60-80				45 - 74	60 - 99
4.0	41.3	54.1	0.99	1.2	0.0	694	Medium dense, Silty sand to sandy silt	36-37	40-60				08 - 11	10 - 15
4.5	77.2	99.1	1.50	2.6	0.0	218	Very dense, Silty sand to sandy silt	36-37	80-100				31 - 47	40 - 60
5.0	25.2	31.8	1.32	2.7	0.0	458	Very stiff, Sandy silt to sandy clay			20	2.49	2.64	08 - 12	10 - 15
5.5	18.1	22.4	0.87	2.3	-0.0	786	Stiff, Sandy silt to sandy clay			20	1.77	1.75	03 - 05	04 - 06
6.0	73.3	89.6	2.11	2.8	0.0	262	Hard, Sandy silt to sandy clay			30	4.66	4.22	33 - 49	40 - 60
6.5	52.8	63.6	2.13	3.0	-0.0	448	Hard, Sandy silt to sandy clay			25	4.19	4.25	17 - 25	20 - 30
7.0	64.3	76.5	2.36	2.6	0.0	354	Dense, Silty sand to sandy silt	27-31	60-80				25 - 34	30 - 40
7.5	85.5	100.3	3.39	3.7	0.0	413	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.67	6.79	51 - 84	60 - 99
8.0	75.1	87.1	2.85	3.2	-0.0	369	Hard, Sandy silt to sandy clay			30	4.98	5.70	35 - 52	40 - 60
8.5	105.9	121.4	2.93	3.3	-0.0	315	Hard, Gravelly clayey sand to gravelly sandy silt			30	7.03	5.87	52 - 86	60 - 99
9.0	61.0	69.1	2.61	3.1	-0.0	462	Hard, Sandy silt to sandy clay			25	4.83	5.22	26 - 35	30 - 40
9.5	91.8	103.0	2.00	2.5	0.0	356	Very dense, Silty sand to sandy silt	36-37	80-100				36 - 53	40 - 60
10.0	42.6	47.3	2.73	3.8	-0.0	323	Very stiff, Sandy clay to silty clay *			25	3.36	5.46	18 - 27	20 - 30
10.5	59.9	66.2	2.73	3.1	-0.0	365	Hard, Sandy silt to sandy clay			25	4.74	5.47	27 - 36	30 - 40
11.0	68.0	74.8	2.38	2.7	-0.0	325	Hard, Sandy silt to sandy clay			25	5.38	4.75	27 - 36	30 - 40
11.5	13.8	15.1	0.78	2.5	0.1	353	Stiff, Clayey silt to silty clay			15	1.75	1.55	04 - 05	04 - 06
12.0	19.7	21.5	0.96	4.3	0.1	314	Stiff, Silty clay to clay *			20	1.90	1.92	09 - 14	10 - 15
12.5	21.2	23.1	1.46	6.6	0.0	315	Very stiff, Silty clay to clay *			18	2.28	2.91	18 - 28	20 - 30
13.0	22.5	24.3	1.72	6.1	-0.0	311	Very stiff, Silty clay to clay *			20	2.17	3.44	14 - 18	15 - 20
13.5	40.0	43.0	2.07	6.3	-0.0	243	Very stiff, Sandy clay to silty clay **			25	3.13	4.14	37 - 56	40 - 60
14.0	34.0	36.4	1.72	3.0	-0.0	284	Very stiff, Sandy silt to sandy clay			25	2.65	3.44	14 - 19	15 - 20
14.5	59.5	63.5	1.28	2.0	-0.0	260	Dense, Silty sand to sandy silt	36-37	80-80				19 - 28	20 - 30
15.0	51.1	54.3	1.23	2.0	-0.0	184	Medium dense, Silty sand to sandy silt	36-37	40-60				14 - 19	15 - 20
15.5	39.8	42.1	1.63	3.5	-0.0	251	Very stiff, Sandy clay to silty clay *			25	3.11	3.26	19 - 28	20 - 30
16.0	10.9	11.5	0.61	3.6	-0.0	315	Stiff, Silty clay to clay *			15	1.32	1.22	04 - 06	04 - 06
16.5	17.2	18.1	1.19	4.5	-0.0	230	Very stiff, Silty clay to clay *			15	2.16	2.39	06 - 10	06 - 10
17.0	22.9	24.0	1.61	3.2	0.0	199	Very stiff, Sandy clay to silty clay *			20	2.19	3.21	06 - 10	06 - 10
17.5	48.4	50.5	1.97	3.7	-0.0	224	Very stiff, Sandy clay to silty clay *			25	3.79	3.95	19 - 29	20 - 30
18.0	36.0	37.5	1.83	3.9	-0.0	148	Very stiff, Sandy clay to silty clay *			25	2.80	3.66	19 - 29	20 - 30
18.5	43.8	45.3	1.88	3.6	0.0	199	Very stiff, Sandy clay to silty clay *			25	3.41	3.76	19 - 29	20 - 30
19.0	96.9	100.0	0.85	0.9	0.0	288	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
19.5	94.3	97.0	1.21	1.2	-0.0	261	Medium dense, Sand to silty sand	40-42	40-60				19 - 29	20 - 30
20.0	54.7	56.1	0.89	1.2	-0.0	201	Medium dense, Silty sand to sandy silt	37-40	40-60				10 - 15	10 - 15
20.5	25.5	26.0	0.92	2.5	-0.0	262	Very stiff, Sandy silt to sandy clay			20	2.43	1.84	06 - 10	06 - 10
21.0	36.3	37.0	2.78	5.9	-0.0	317	Very stiff, Silty clay to clay *			25	2.81	5.57	29 - 39	30 - 40
21.5	64.0	65.0	3.91	7.2	-0.0	193	Hard, Sandy clay to silty clay **			24	5.23	7.82	+ 99	+ 100
22.0	33.2	33.6	3.83	6.8	0.1	281	Very stiff, Sandy clay to silty clay **			25	2.55	7.66	30 - 40	30 - 40
22.5	87.6	88.3	5.50	6.4	-0.0	306	Hard, Sandy clay to silty clay **			30	5.75	11.00	+ 99	+ 100
23.0	75.2	75.5	5.23	5.8	-0.0	276	Hard, Sandy clay to silty clay **			30	4.92	10.46	+ 99	+ 100
23.5	100.6	100.8	6.01	6.3	-0.0	278	Hard, Sandy clay to silty clay **			33	6.01	12.01	+ 100	+ 100
24.0	80.4	80.3	5.60	5.6	0.0	311	Hard, Sandy clay to silty clay **			30	5.26	11.20	+ 100	+ 100
24.5	122.9	122.4	7.22	5.1	-0.0	365	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.36	14.44	+ 100	+ 100
25.0	185.0	183.6	9.51	5.6	-0.0	244	Hard, Gravelly sandy clay to hardpan **			33	11.12	19.01	+ 101	+ 100

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# **STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:07:30:52.12

SOUNDING NUMBER:CP-013A

Page 2

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	146.6	145.1	10.18	3.7	-0.0	351	Hard, Gravelly clayey sand to gravelly sandy silt			33	8.79	20.37	+ 101	+ 100
26.0	467.3	461.0	9.31	2.0	-0.1	270	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 101	+ 100
26.5	446.6	439.3	6.46	1.3	-0.0	269	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 102	+ 100
27.0	465.2	456.2	25.77	3.1	-0.0	476	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 102	+ 100

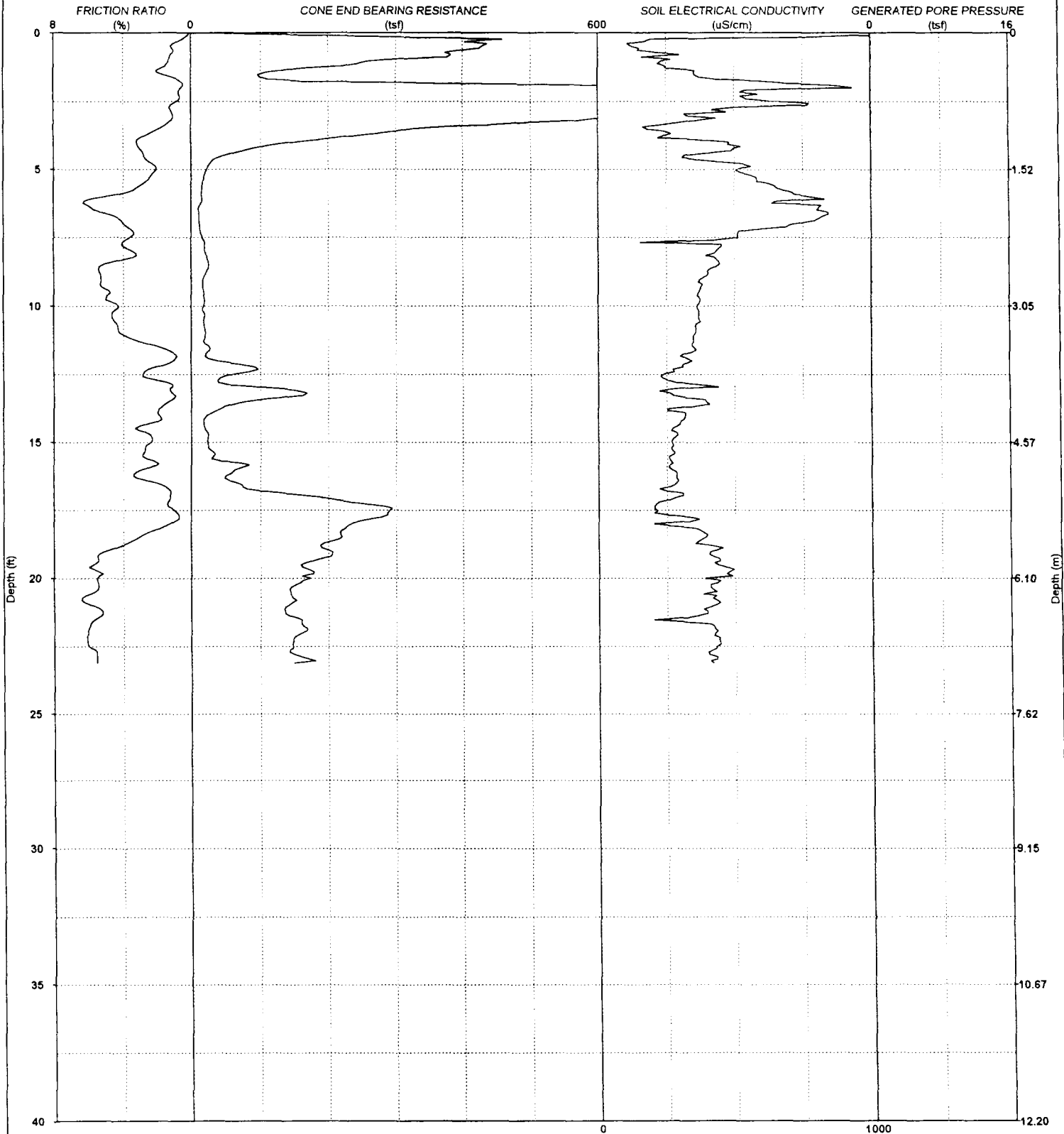
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:08:17:50.46

SOUNDING NUMBER:CP-014

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	274.1	441.5	4.61	1.3	0.0	183	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 62	+ 100
1.5	99.7	151.8	5.12	1.7	0.0	356	Dense, Silty sand to sandy silt	40-42	60-80				26 - 39	40 - 60
2.0	742.5	1084.4	5.46	0.6	0.0	934	Very dense, Sandy gravel to gravelly sand	+46	+100				+ 68	+ 100
2.5	1053.6	1487.6	8.80	0.9	-0.0	663	Very dense, Sandy gravel to gravelly sand	+46	+100				+ 71	+ 100
3.0	788.5	1082.0	11.27	1.1	-0.0	320	Very dense, Sandy gravel to gravelly sand	+46	+100				+ 73	+ 100
3.5	331.8	444.2	10.03	1.9	0.0	177	Very dense, Sandy gravel to silty gravelly sand	42-48	+100				+ 75	+ 100
4.0	152.7	200.0	7.77	3.2	-0.0	482	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 76	+ 100
4.5	45.4	58.4	2.48	2.8	-0.0	314	Very stiff, Sandy silt to sandy clay			25	3.61	4.97	16 - 23	20 - 30
5.0	21.9	27.6	0.60	2.1	-0.0	515	Very stiff, Sandy silt to sandy clay			20	2.16	1.20	05 - 08	06 - 10
5.5	16.5	20.5	0.51	2.8	-0.0	615	Very stiff, Sandy clay to silty clay *			15	2.16	1.01	05 - 08	06 - 10
6.0	15.0	18.3	0.78	5.0	-0.0	773	Stiff, Silty clay to clay *			15	1.95	1.56	08 - 12	10 - 15
6.5	10.2	12.3	0.74	5.6	-0.0	813	Stiff, Silty clay to clay *			15	1.31	1.48	05 - 08	06 - 10
7.0	11.5	13.7	0.51	4.0	-0.0	725	Stiff, Silty clay to clay *			15	1.48	1.03	03 - 05	04 - 06
7.5	15.8	18.5	0.67	3.6	-0.0	514	Very stiff, Silty clay to clay *			15	2.04	1.34	05 - 09	06 - 10
8.0	19.6	22.7	0.80	3.5	-0.0	436	Stiff, Sandy clay to silty clay *			20	1.91	1.60	05 - 09	06 - 10
8.5	25.4	29.1	1.22	5.2	0.0	443	Stiff, Silty clay to clay *			25	1.99	2.43	17 - 26	20 - 30
9.0	16.8	19.1	1.13	5.3	-0.0	380	Stiff, Silty clay to clay *			20	1.63	2.27	09 - 13	10 - 15
9.5	17.1	19.2	0.86	4.8	-0.0	368	Stiff, Silty clay to clay *			20	1.85	1.73	09 - 13	10 - 15
10.0	17.8	19.8	0.78	4.3	-0.0	362	Stiff, Silty clay to clay *			20	1.72	1.52	05 - 09	06 - 10
10.5	17.9	19.8	0.87	4.6	-0.0	372	Stiff, Silty clay to clay *			20	1.73	1.74	09 - 14	10 - 15
11.0	20.4	22.4	0.85	4.1	-0.0	354	Stiff, Silty clay to clay *			20	1.97	1.69	09 - 14	10 - 15
11.5	26.0	28.4	0.45	1.8	-0.0	349	Medium dense, Silty sand to sandy silt	27-31	40-60				05 - 09	08 - 10
12.0	38.3	41.7	0.79	1.1	0.0	345	Loose, Silty sand to sandy silt	36-37	20-40				06 - 09	06 - 10
12.5	58.6	63.7	2.08	2.8	-0.0	238	Hard, Sandy silt to sandy clay			25	4.63	4.17	18 - 28	20 - 30
13.0	111.3	120.4	1.52	1.2	-0.0	359	Medium dense, Sand to silty sand	40-42	40-60				28 - 37	30 - 40
13.5	80.6	86.8	1.75	1.3	-0.0	396	Medium dense, Silty sand to sandy silt	37-40	40-60				19 - 28	20 - 30
14.0	22.5	24.1	0.87	1.9	-0.0	319	Very stiff, Sandy silt to sandy clay			20	2.16	1.74	04 - 06	04 - 06
14.5	19.5	20.8	0.76	3.2	-0.0	271	Stiff, Sandy clay to silty clay *			20	1.86	1.51	06 - 09	06 - 10
15.0	23.2	24.6	0.65	2.4	-0.0	270	Very stiff, Sandy silt to sandy clay			20	2.23	1.31	06 - 09	06 - 10
15.5	32.0	33.9	1.66	2.9	0.0	262	Very stiff, Sandy silt to sandy clay			20	3.11	3.32	09 - 14	10 - 15
16.0	62.9	66.4	1.69	2.9	-0.0	270	Hard, Sandy silt to sandy clay			25	4.96	3.38	19 - 28	20 - 30
16.5	67.4	70.9	1.96	2.0	-0.0	284	Dense, Silty sand to sandy silt	36-37	60-80				19 - 29	20 - 30
17.0	180.5	189.1	3.11	1.3	-0.0	297	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
17.5	290.9	303.6	2.74	1.0	-0.1	212	Dense, Sand to silty sand	42-46	60-80				57 - 95	60 - 99
18.0	233.7	243.1	3.42	1.3	-0.0	205	Dense, Sand to silty sand	42-46	60-80				58 - 95	60 - 99
18.5	219.5	227.4	6.87	3.1	-0.0	390	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
19.0	203.0	209.6	10.12	5.0	-0.0	420	Hard, Gravelly sandy clay to hardpan **			33	12.23	20.24	+ 97	+ 100
19.5	161.4	166.1	10.71	5.7	-0.1	435	Hard, Hardpan to weak rock			33	9.71	21.42	+ 97	+ 100
20.0	173.5	177.9	9.45	5.5	-0.0	390	Hard, Gravelly sandy clay to hardpan **			33	10.44	18.90	+ 98	+ 100
20.5	144.7	147.9	8.67	5.7	-0.0	421	Hard, Hardpan to weak rock			33	8.70	17.34	+ 98	+ 100
21.0	140.0	142.6	8.34	5.8	-0.0	420	Hard, Hardpan to weak rock			33	8.41	16.69	+ 98	+ 100
21.5	158.7	161.1	9.23	5.7	-0.0	233	Hard, Hardpan to weak rock			33	9.54	18.45	+ 99	+ 100
22.0	160.7	162.6	9.93	6.1	-0.0	427	Hard, Hardpan to weak rock			33	9.66	19.86	+ 99	+ 100
22.5	148.0	149.3	9.34	6.0	-0.0	434	Hard, Hardpan to weak rock			33	8.89	18.68	+ 99	+ 100
23.0	176.2	177.1	11.86	5.6	-0.0	422	Hard, Gravelly sandy clay to hardpan **			33	10.60	23.72	+ 99	+ 100

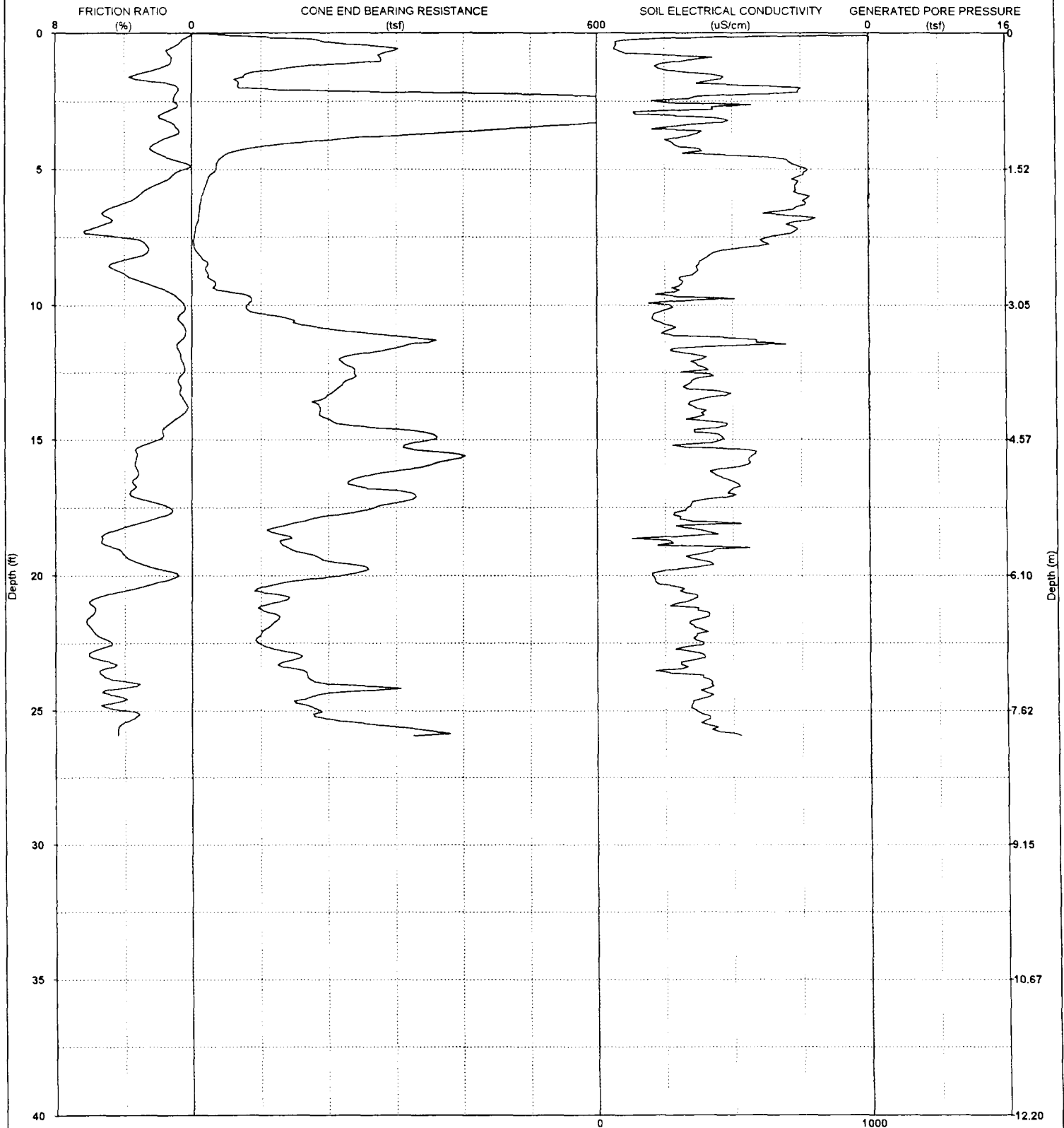
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:08:43:45.40

SOUNDING NUMBER:CP-015

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	319.5	514.6	1.99	0.9	0.0	264	Very dense, Sand to silty sand	+46	80-100				+ 62	+ 100
1.5	78.3	119.2	5.21	3.2	0.0	407	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.21	10.42	39 - 65	60 - 99
2.0	68.1	99.4	3.59	0.8	-0.0	752	Medium dense, Sand to silty sand	40-42	40-60				14 - 21	20 - 30
2.5	815.3	1151.1	10.40	1.0	0.0	221	Very dense, Sandy gravel to gravelly sand	+46	+100				+ 71	+ 100
3.0	1000.8	1373.5	17.69	1.9	-0.0	220	Very dense, UNDEFINED	42-46	+100				+ 73	+ 100
3.5	476.9	638.5	6.90	0.9	-0.0	222	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 75	+ 100
4.0	161.3	211.2	6.16	2.0	0.0	277	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				46 - 76	60 - 99
4.5	45.4	58.3	1.46	1.7	0.0	521	Medium dense, Silty sand to sandy silt	36-37	40-60				12 - 16	15 - 20
5.0	34.8	43.9	0.18	0.4	0.1	773	Loose, Sand to silty sand	37-40	20-40				05 - 08	06 - 10
5.5	21.3	26.5	0.48	1.8	0.0	738	Medium dense, Silty sand to sandy silt	27-31	40-60				03 - 05	04 - 06
6.0	14.9	18.2	0.56	3.2	0.1	785	Stiff, Sandy clay to silty clay *			15	1.94	1.12	05 - 08	06 - 10
6.5	11.1	13.4	0.63	5.0	0.0	707	Stiff, Silty clay to clay *			15	1.43	1.26	05 - 08	06 - 10
7.0	7.2	8.6	0.47	5.0	-0.0	708	Stiff, Silty clay to clay *			10	1.36	0.95	03 - 05	04 - 06
7.5	2.9	3.4	0.19	4.4	0.0	642	Soft, Clay			18	0.27	0.39	00 - 02	00 - 02
8.0	5.7	6.6	0.36	2.5	-0.0	461	Stiff, Clayey silt to silty clay			10	1.04	0.72	00 - 02	00 - 02
8.5	23.1	26.5	1.07	4.8	-0.0	377	Very stiff, Silty clay to clay *			20	2.26	2.15	13 - 17	15 - 20
9.0	24.4	27.7	1.20	3.6	-0.0	305	Very stiff, Sandy clay to silty clay *			20	2.39	2.40	09 - 13	10 - 15
9.5	50.5	56.7	1.08	1.4	-0.0	289	Medium dense, Silty sand to sandy silt	36-37	40-60				13 - 18	15 - 20
10.0	80.7	89.7	0.39	0.4	-0.0	272	Medium dense, Sand to silty sand	40-42	40-60				14 - 18	15 - 20
10.5	143.0	158.1	1.47	0.8	-0.0	206	Medium dense, Sand to silty sand	42-46	40-60				27 - 36	30 - 40
11.0	241.3	265.6	1.16	0.4	-0.0	245	Dense, Sandy gravel to gravelly sand	+46	80-80				36 - 55	40 - 60
11.5	314.0	344.1	2.95	0.9	-0.0	505	Dense, Sand to silty sand	42-46	80-80				55 - 90	60 - 99
12.0	216.3	236.0	1.73	0.6	-0.0	387	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
12.5	238.6	259.1	1.16	0.5	0.0	337	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
13.0	218.5	236.3	1.51	0.7	-0.0	325	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
13.5	191.2	205.9	1.05	0.5	0.0	384	Medium dense, Sand to silty sand	42-46	40-60				37 - 56	40 - 60
14.0	187.5	201.1	0.90	0.5	-0.0	387	Medium dense, Sand to silty sand	42-46	40-60				37 - 56	40 - 60
14.5	244.5	261.2	5.07	1.6	-0.0	469	Very dense, Sand to silty sand	42-46	80-100				56 - 93	60 - 99
15.0	352.8	375.4	6.69	2.0	-0.0	462	Very dense, Sandy gravel to silty gravelly sand	40-42	+100				+ 94	+ 100
15.5	381.5	404.3	12.00	3.3	-0.0	585	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 94	+ 100
16.0	339.2	358.1	12.57	3.3	0.0	522	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 95	+ 100
16.5	232.7	244.8	10.06	3.5	-0.0	493	Hard, Gravelly clayey sand to gravelly sandy silt			33	14.05	20.12	+ 95	+ 100
17.0	325.6	341.1	11.42	3.7	-0.0	497	Hard, Gravelly clayey sand to gravelly sandy clay			33	19.67	22.85	+ 95	+ 100
17.5	268.4	280.2	3.80	1.3	-0.0	335	Very dense, Sand to silty sand	42-46	80-100				57 - 95	60 - 99
18.0	166.2	172.9	5.76	2.7	-0.0	349	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 96	+ 100
18.5	131.3	136.1	7.37	5.2	0.0	408	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.89	14.75	+ 97	+ 100
19.0	141.9	146.5	7.55	4.5	0.0	497	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.53	15.10	+ 97	+ 100
19.5	205.3	211.2	7.97	3.3	0.0	411	Hard, Gravelly clayey sand to gravelly sandy silt			33	12.37	15.94	+ 97	+ 100
20.0	218.9	224.4	1.81	0.8	-0.0	205	Dense, Sand to silty sand	42-46	60-80				39 - 59	40 - 60
20.5	94.3	96.3	5.06	3.6	-0.0	318	Hard, Gravelly clayey sand to gravelly sandy silt			30	6.20	10.11	59 - 97	60 - 99
21.0	121.6	123.9	7.36	6.0	-0.0	310	Hard, Hardpan to weak rock			33	7.29	14.71	+ 98	+ 100
21.5	127.2	129.1	7.06	6.0	-0.0	413	Hard, Hardpan to weak rock			33	7.63	14.12	+ 99	+ 100
22.0	105.3	106.5	6.93	5.9	-0.0	385	Hard, Sandy clay to silty clay **			33	6.30	13.86	+ 99	+ 100
22.5	96.8	97.6	5.69	4.7	-0.0	391	Hard, Gravelly sandy clay to gravelly silty clay **			30	6.36	11.78	+ 99	+ 100
23.0	160.6	161.4	6.67	6.0	-0.0	397	Hard, Hardpan to weak rock			33	9.65	17.34	+ 99	+ 100
23.5	160.9	161.2	9.61	5.4	-0.0	239	Hard, Gravelly sandy clay to hardpan **			33	9.67	19.21	+ 100	+ 100
24.0	198.1	197.8	5.50	3.1	-0.0	420	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 100	+ 100
24.5	173.2	172.4	8.74	4.1	0.0	401	Hard, Gravelly clayey sand to gravelly sandy silt			33	10.41	17.48	+ 100	+ 100
25.0	189.2	187.8	7.10	3.8	0.0	368	Hard, Gravelly clayey sand to gravelly sandy silt			33	11.38	14.19	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:08:43:45.40

SOUNDING NUMBER:CP-015

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	265.4	262.6	13.96	4.2	-0.0	403	Hard, Gravelly clayey sand to gravelly sandy clay			33	15.99	27.92	+ 101	+ 100

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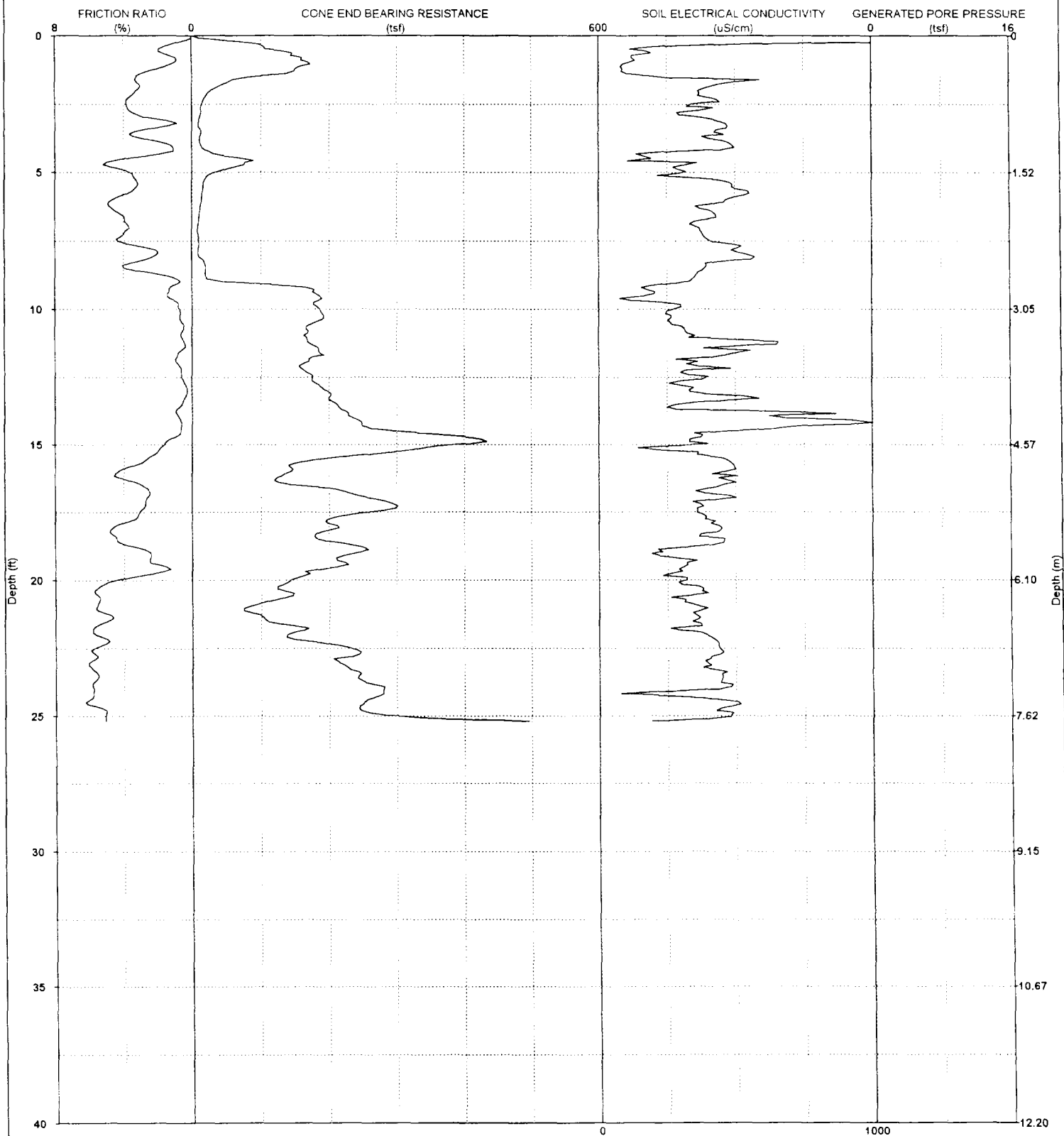
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# CPT-EC LOG





**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:09:29:03.38

SOUNDING NUMBER:CP-016

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	167.0	269.0	0.75	0.9	-0.0	69	Dense, Sand to silty sand	42-46	60-80				25 - 37	40 - 60
1.5	85.3	129.9	4.53	3.3	-0.1	218	Hard, Gravelly clayey sand to gravelly sandy silt				5.68	9.06	39 - 65	60 - 99
2.0	26.6	38.9	1.56	3.3	-0.1	364	Very stiff, Sandy clay to silty clay *			30	2.12	3.12	10 - 14	15 - 20
2.5	13.6	19.2	0.71	3.8	-0.1	336	Stiff, Silty clay to clay *			15	1.79	1.43	04 - 07	06 - 10
3.0	9.9	13.7	0.32	2.5	-0.0	387	Stiff, Clayey silt to silty clay			15	1.30	0.65	01 - 03	02 - 04
3.5	12.9	17.3	0.39	3.3	-0.0	426	Stiff, Sandy clay to silty clay *			15	1.69	0.78	03 - 04	04 - 06
4.0	12.4	16.2	0.36	1.2	-0.1	492	Loose, Silty sand to sandy silt	27-31	20-40				00 - 02	00 - 02
4.5	76.3	98.0	2.47	3.9	0.0	171	Hard, Gravelly sandy clay to gravelly silty clay **			30	5.07	4.95	47 - 77	60 - 99
5.0	33.2	41.8	2.20	3.6	-0.0	306	Very stiff, Sandy clay to silty clay *			25	2.63	4.40	16 - 24	20 - 30
5.5	16.2	20.1	0.65	3.2	-0.0	490	Very stiff, Sandy clay to silty clay *			15	2.12	1.29	05 - 08	06 - 10
6.0	13.9	16.9	0.70	4.6	-0.1	467	Stiff, Silty clay to clay *			15	1.80	1.40	05 - 08	06 - 10
6.5	10.8	13.0	0.51	4.2	-0.0	426	Stiff, Silty clay to clay *			15	1.39	1.02	03 - 05	04 - 06
7.0	8.3	9.9	0.33	3.7	-0.0	360	Stiff, Silty clay to clay			15	1.05	0.66	02 - 03	02 - 04
7.5	9.9	11.6	0.42	4.3	-0.1	409	Stiff, Silty clay to clay *			15	1.26	0.84	03 - 05	04 - 06
8.0	8.5	9.8	0.32	2.1	-0.0	547	Stiff, Clayey silt to silty clay			15	1.07	0.64	00 - 02	00 - 02
8.5	19.6	22.5	0.98	3.8	-0.0	385	Stiff, Silty clay to clay *			20	1.91	1.95	09 - 13	10 - 15
9.0	60.0	68.0	0.94	0.7	-0.0	313	Medium dense, Sand to silty sand	37-40	40-60				09 - 13	10 - 15
9.5	184.6	207.1	2.84	1.4	-0.1	175	Dense, Sand to silty sand	42-46	60-80				36 - 53	40 - 60
10.0	185.9	206.5	1.40	0.8	-0.1	275	Dense, Sand to silty sand	42-46	60-80				36 - 54	40 - 60
10.5	178.2	197.1	1.11	0.6	-0.0	263	Dense, Sand to silty sand	42-46	60-80				36 - 54	40 - 60
11.0	185.2	181.9	1.16	0.6	-0.1	342	Medium dense, Sand to silty sand	42-46	40-60				36 - 55	40 - 60
11.5	184.9	202.6	1.23	0.6	-0.0	513	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
12.0	161.9	176.7	1.53	0.8	-0.1	321	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
12.5	176.7	191.9	1.07	0.6	-0.1	395	Medium dense, Sand to silty sand	42-46	40-60				37 - 55	40 - 60
13.0	197.1	213.2	0.57	0.3	-0.1	333	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				37 - 55	40 - 60
13.5	211.6	227.9	1.15	0.6	-0.1	294	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
14.0	234.8	251.8	1.95	0.8	-0.1	678	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
14.5	303.2	323.8	2.57	0.7	-0.1	473	Dense, Sand to silty sand	42-46	60-80				56 - 93	60 - 99
15.0	387.6	412.3	6.14	1.6	-0.0	349	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 94	+ 100
15.5	202.6	214.7	7.73	2.6	-0.1	445	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 94	+ 100
16.0	144.1	152.1	6.52	4.3	-0.1	462	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.67	13.04	+ 95	+ 100
16.5	151.8	159.6	6.27	2.9	-0.0	449	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 95	+ 100
17.0	264.4	277.0	7.68	2.7	-0.0	470	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 95	+ 100
17.5	261.7	273.1	8.76	3.1	-0.1	357	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 96	+ 100
18.0	212.6	221.1	9.68	4.4	-0.1	440	Hard, Gravelly clayey sand to gravelly sandy clay			33	12.82	19.36	+ 96	+ 100
18.5	185.4	192.1	9.99	4.4	-0.1	462	Hard, Gravelly sandy clay to gravelly silty clay **			33	11.17	19.99	+ 97	+ 100
19.0	241.5	249.3	5.57	2.5	-0.0	214	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 97	+ 100
19.5	216.1	222.4	3.01	1.6	-0.0	313	Very dense, Sand to silty sand	40-42	80-100				58 - 96	60 - 99
20.0	143.7	147.3	7.69	4.4	-0.0	319	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.63	15.38	+ 98	+ 100
20.5	148.6	151.9	7.70	5.7	-0.1	384	Hard, Hardpan to weak rock			33	8.93	15.40	+ 98	+ 100
21.0	78.5	79.9	6.42	5.6	-0.1	384	Hard, Sandy clay to silty clay **			30	5.15	12.84	+ 98	+ 100
21.5	109.2	110.8	6.99	5.0	-0.1	346	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.54	13.98	+ 99	+ 100
22.0	138.5	140.1	10.19	5.7	-0.1	394	Hard, Hardpan to weak rock			33	8.31	20.38	+ 99	+ 100
22.5	233.6	235.5	13.37	5.8	-0.1	442	Hard, Gravelly sandy clay to hardpan **			33	14.07	26.74	+ 99	+ 100
23.0	214.2	215.3	14.18	6.0	-0.0	391	Hard, Hardpan to weak rock			33	12.90	28.37	+ 99	+ 100
23.5	244.5	244.9	14.23	5.5	-0.1	451	Hard, Gravelly sandy clay to hardpan **			33	14.73	28.46	+ 100	+ 100
24.0	281.0	280.6	15.44	5.8	-0.0	444	Hard, Gravelly sandy clay to hardpan **			33	16.94	30.88	+ 100	+ 100
24.5	251.4	250.3	17.17	6.3	-0.1	511	Hard, Hardpan to weak rock			33	15.15	34.33	+ 100	+ 100
25.0	297.9	295.7	13.96	5.1	-0.1	480	Hard, Gravelly sandy clay to hardpan **			33	17.97	27.92	+ 101	+ 100

\* Indicates lightly overconsolidated soil

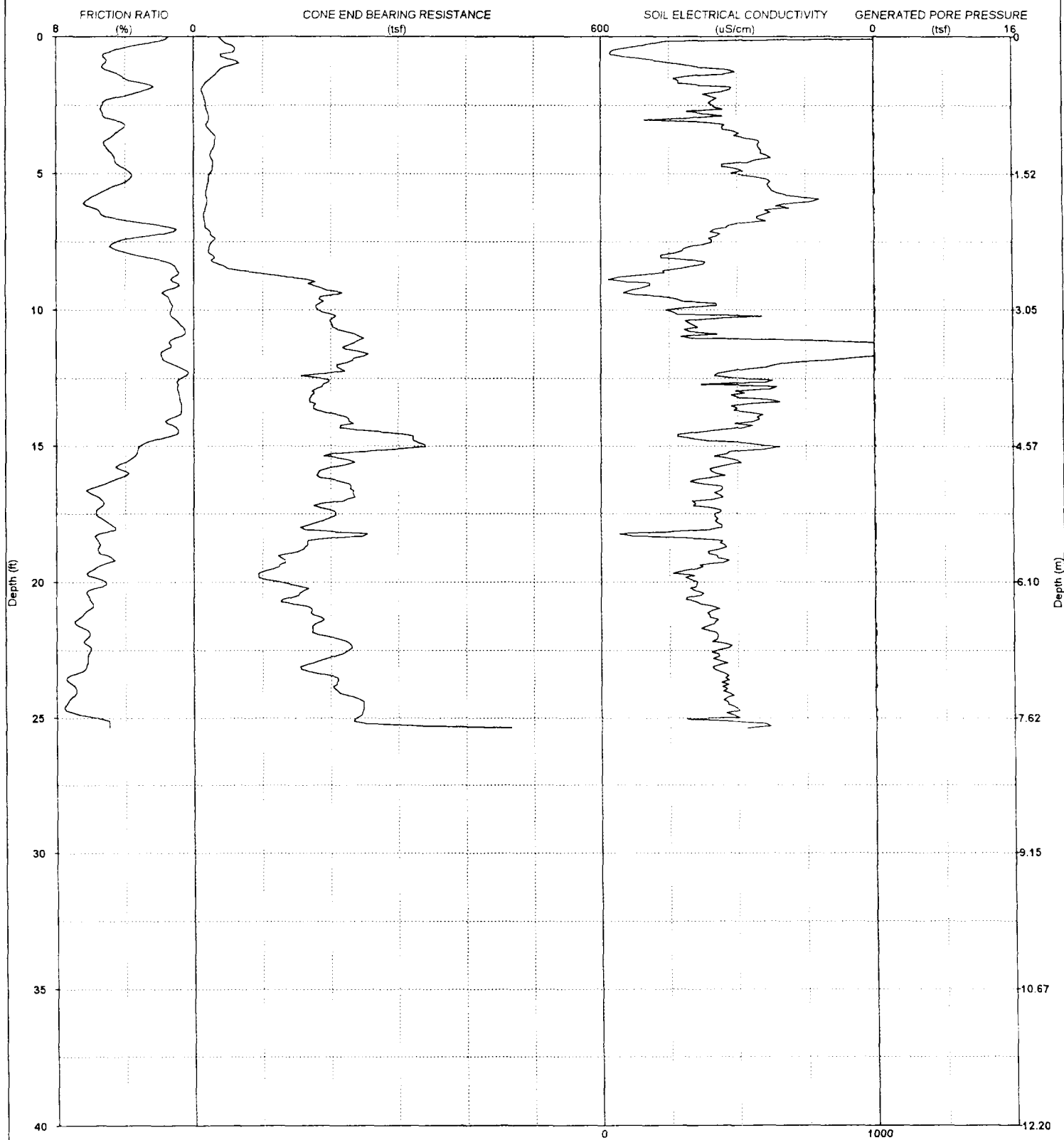
\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
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Structure rate of loading should be considered in choosing which strength parameters to use for design.

Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:10:02:12.40

SOUNDING NUMBER:CP-017

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	50.9	82.0	2.84	5.6	0.1	200	Very stiff, Sandy clay to silty clay **			30	3.39	5.68	+ 62	+ 100
1.5	25.2	38.4	1.56	4.1	0.0	283	Very stiff, Sandy clay to silty clay *			25	2.01	3.11	13 - 20	20 - 30
2.0	11.1	16.2	0.50	3.1	0.0	445	Stiff, Sandy clay to silty clay *			15	1.46	1.00	03 - 04	04 - 06
2.5	17.1	24.2	1.02	5.3	0.0	413	Stiff, Silty clay to clay *			20	1.70	2.05	11 - 14	15 - 20
3.0	21.2	29.1	1.06	4.9	0.0	243	Stiff, Silty clay to clay *			25	1.68	2.11	11 - 15	15 - 20
3.5	26.6	35.6	1.33	4.5	0.0	504	Very stiff, Silty clay to clay *			25	2.11	2.66	15 - 22	20 - 30
4.0	28.7	37.6	1.52	5.2	0.0	579	Very stiff, Silty clay to clay *			25	2.28	3.04	15 - 23	20 - 30
4.5	26.6	34.2	1.18	4.6	0.0	560	Very stiff, Silty clay to clay *			25	2.11	2.36	16 - 23	20 - 30
5.0	22.1	27.9	0.92	3.6	0.0	496	Very stiff, Sandy clay to silty clay *			20	2.18	1.85	08 - 12	10 - 15
5.5	18.0	22.3	0.96	4.8	0.0	622	Stiff, Silty clay to clay *			20	1.77	1.93	08 - 12	10 - 15
6.0	19.4	23.7	1.13	6.3	0.0	773	Stiff, Silty clay to clay *			20	1.90	2.26	12 - 16	15 - 20
6.5	13.4	16.1	0.89	5.3	0.0	590	Stiff, Silty clay to clay *			15	1.73	1.78	05 - 08	06 - 10
7.0	18.3	21.7	0.24	1.2	0.0	438	Loose, Silty sand to sandy silt	27-31	20-40				03 - 05	04 - 06
7.5	26.3	30.9	1.10	4.5	0.0	408	Very stiff, Silty clay to clay *			25	2.07	2.19	13 - 17	15 - 20
8.0	27.1	31.4	1.17	3.4	0.0	220	Very stiff, Sandy clay to silty clay *			20	2.66	2.34	09 - 13	10 - 15
8.5	53.1	60.9	1.28	1.0	0.0	278	Medium dense, Sand to silty sand	37-40	40-60				09 - 13	10 - 15
9.0	172.4	195.5	2.01	1.1	0.0	134	Dense, Sand to silty sand	42-46	60-80				35 - 53	40 - 60
9.5	191.8	215.2	2.73	1.6	0.0	204	Dense, Sand to silty sand	40-42	60-80				53 - 88	60 - 99
10.0	181.9	202.1	2.73	1.3	0.1	238	Dense, Sand to silty sand	42-46	60-80				36 - 54	40 - 60
10.5	201.0	222.2	1.89	0.8	0.0	327	Dense, Sand to silty sand	42-46	60-80				36 - 54	40 - 60
11.0	245.9	270.7	2.02	0.9	0.0	311	Dense, Sand to silty sand	42-46	60-80				55 - 90	60 - 99
11.5	237.3	260.0	4.65	1.8	0.0	1170	Very dense, Sandy gravel to silty gravelly sand	40-42	80-100				+ 91	+ 100
12.0	209.3	228.3	2.83	1.2	0.0	636	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
12.5	186.7	202.8	1.52	0.8	0.0	522	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
13.0	175.0	189.3	1.62	0.9	0.0	512	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
13.5	175.6	189.1	1.33	0.7	0.0	493	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
14.0	227.6	244.1	3.80	1.5	0.0	584	Very dense, Sand to silty sand	42-46	80-100				56 - 92	60 - 99
14.5	284.5	303.9	2.74	0.9	0.0	339	Dense, Sand to silty sand	42-46	60-80				56 - 93	60 - 99
15.0	340.0	361.7	10.13	3.1	0.0	624	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 94	+ 100
15.5	222.8	236.1	9.17	3.7	0.0	485	Hard, Gravelly clayey sand to gravelly sandy silt			33	13.44	18.33	+ 94	+ 100
16.0	182.0	192.1	7.38	3.8	0.0	422	Hard, Gravelly clayey sand to gravelly sandy silt			33	10.97	14.76	+ 95	+ 100
16.5	230.1	241.9	13.21	5.7	0.0	443	Hard, Gravelly sandy clay to hardpan **			33	13.88	26.43	+ 95	+ 100
17.0	220.6	231.1	12.33	5.4	0.0	371	Hard, Gravelly sandy clay to hardpan **			33	13.31	24.65	+ 95	+ 100
17.5	208.3	217.5	11.28	5.7	0.0	422	Hard, Gravelly sandy clay to hardpan **			33	12.56	22.56	+ 96	+ 100
18.0	156.3	162.5	8.72	4.6	0.1	442	Hard, Gravelly sandy clay to gravelly silty clay **			33	9.41	17.44	+ 96	+ 100
18.5	166.4	172.4	11.17	5.6	0.0	443	Hard, Gravelly sandy clay to hardpan **			33	10.02	22.34	+ 97	+ 100
19.0	130.7	135.0	8.29	5.2	0.0	411	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.85	16.58	+ 97	+ 100
19.5	118.1	121.6	7.28	5.8	0.0	354	Hard, Sandy clay to silty clay **			33	7.09	14.56	+ 97	+ 100
20.0	126.5	129.7	7.67	5.1	0.0	353	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.59	15.34	+ 98	+ 100
20.5	150.2	153.5	9.23	6.2	0.0	351	Hard, Hardpan to weak rock			33	9.03	18.46	+ 98	+ 100
21.0	173.1	176.3	11.06	6.1	0.0	419	Hard, Hardpan to weak rock			33	10.41	22.11	+ 98	+ 100
21.5	180.3	183.0	12.63	7.0	0.0	415	Hard, Hardpan to weak rock			33	10.85	25.25	+ 99	+ 100
22.0	197.8	200.0	13.51	6.2	0.0	425	Hard, Hardpan to weak rock			33	11.90	27.02	+ 99	+ 100
22.5	225.7	227.6	13.51	6.0	0.0	423	Hard, Gravelly sandy clay to hardpan **			33	13.60	27.02	+ 99	+ 100
23.0	169.7	170.5	12.40	6.2	0.0	446	Hard, Hardpan to weak rock			33	10.20	24.80	+ 99	+ 100
23.5	207.4	207.8	15.57	7.4	0.0	455	Hard, Hardpan to weak rock			33	12.48	31.14	+ 100	+ 100
24.0	210.4	210.1	15.84	6.8	0.0	446	Hard, Hardpan to weak rock			33	12.66	31.68	+ 100	+ 100
24.5	248.7	247.6	18.35	7.5	0.0	469	Hard, Hardpan to weak rock			33	14.98	36.70	+ 100	+ 100
25.0	237.7	236.0	16.81	5.7	0.0	409	Hard, Gravelly sandy clay to hardpan **			33	14.32	33.62	+ 101	+ 100

\* Indicates lightly overconsolidated soil

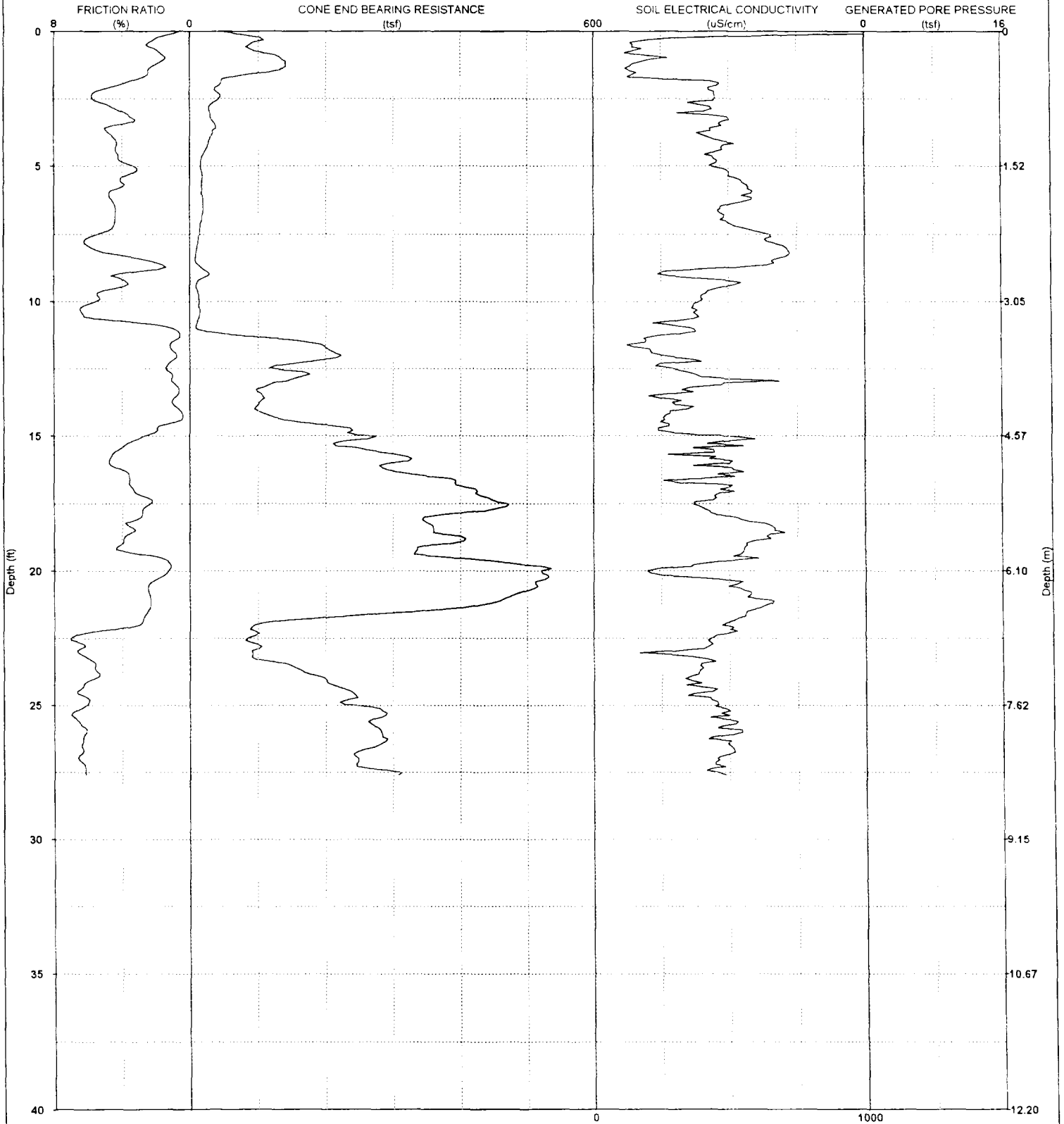
\*\* Indicates heavily overconsolidated or cemented soil

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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:10:34:45.77

SOUNDING NUMBER:CP-018

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	143.0	230.4	1.81	1.4	-0.0	228	Dense, Sand to silty sand	42-48	60-80				37 - 61	60 - 99
1.5	119.5	181.9	3.27	2.5	-0.1	153	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				+ 66	+ 100
2.0	41.9	61.1	2.64	4.2	-0.1	459	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	2.78	5.28	27 - 41	40 - 60
2.5	41.9	59.1	2.37	5.7	-0.1	450	Very stiff, Sandy clay to silty clay **			30	2.78	4.74	28 - 42	40 - 60
3.0	28.5	39.1	1.30	4.0	-0.1	361	Very stiff, Sandy clay to silty clay *			25	2.26	2.60	15 - 22	20 - 30
3.5	36.8	49.2	1.56	4.4	-0.0	473	Very stiff, Silty clay to clay *			25	2.93	3.11	22 - 30	30 - 40
4.0	28.6	37.4	1.46	4.4	-0.1	447	Very stiff, Silty clay to clay *			25	2.27	2.92	15 - 23	20 - 30
4.5	20.5	26.3	1.08	4.3	-0.1	436	Very stiff, Silty clay to clay *			20	2.02	2.15	12 - 16	15 - 20
5.0	15.3	19.3	0.56	3.4	-0.1	438	Stiff, Sandy clay to silty clay *			15	2.00	1.13	05 - 08	06 - 10
5.5	17.4	21.5	0.72	4.1	-0.1	541	Stiff, Silty clay to clay *			20	1.70	1.44	08 - 12	10 - 15
6.0	15.9	19.4	0.89	4.8	-0.1	585	Stiff, Silty clay to clay *			20	1.55	1.78	08 - 12	10 - 15
6.5	19.3	23.2	0.83	4.4	-0.1	472	Stiff, Silty clay to clay *			20	1.89	1.66	08 - 12	10 - 15
7.0	16.5	19.6	0.80	4.4	-0.1	483	Stiff, Silty clay to clay *			20	1.61	1.60	05 - 08	06 - 10
7.5	13.4	15.7	0.78	5.4	-0.1	644	Stiff, Silty clay to clay *			15	1.72	1.57	05 - 09	06 - 10
8.0	9.9	11.5	0.68	5.8	-0.0	715	Stiff, Silty clay to clay *			15	1.26	1.36	05 - 09	06 - 10
8.5	7.9	9.1	0.39	2.2	-0.1	660	Stiff, Clayey silt to silty clay			10	1.48	0.77	00 - 02	00 - 02
9.0	26.7	30.3	0.89	4.4	-0.1	258	Very stiff, Silty clay to clay *			25	2.10	1.79	13 - 18	15 - 20
9.5	9.6	10.8	0.59	4.3	-0.1	464	Stiff, Silty clay to clay *			15	1.20	1.17	04 - 05	04 - 06
10.0	13.4	14.9	0.74	5.6	-0.0	392	Stiff, Silty clay to clay *			15	1.71	1.48	05 - 09	06 - 10
10.5	13.6	15.0	0.85	6.3	-0.1	384	Stiff, Silty clay to clay *			14	1.85	1.70	09 - 14	10 - 15
11.0	9.4	10.3	0.78	1.1	-0.1	365	Stiff, Sandy silt to clayey silt			10	1.74	1.57	00 - 02	00 - 02
11.5	168.3	184.4	2.16	1.0	-0.1	193	Dense, Sand to silty sand	42-48	60-80				37 - 55	40 - 60
12.0	223.1	243.3	1.31	0.8	-0.1	253	Dense, Sand to silty sand	42-46	60-80				37 - 55	40 - 60
12.5	123.3	133.9	2.52	1.4	-0.1	294	Dense, Sand to silty sand	40-42	60-80				37 - 55	40 - 60
13.0	132.9	143.7	1.70	1.0	-0.0	584	Dense, Sand to silty sand	40-42	60-80				28 - 37	30 - 40
13.5	106.4	114.6	0.79	0.7	-0.1	229	Medium dense, Sand to silty sand	40-42	40-60				19 - 28	20 - 30
14.0	94.7	101.5	0.78	0.7	-0.1	346	Medium dense, Sand to silty sand	40-42	40-60				19 - 28	20 - 30
14.5	166.6	178.0	1.86	1.0	-0.0	256	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
15.0	260.7	277.4	6.48	2.6	-0.1	455	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 94	+ 100
15.5	257.4	272.8	12.53	4.2	-0.1	426	Hard, Gravelly clayey sand to gravelly sandy clay			33	15.55	25.07	+ 94	+ 100
16.0	294.2	310.5	14.63	4.8	-0.1	502	Hard, Gravelly sandy clay to hardpan **			33	17.77	29.26	+ 95	+ 100
16.5	359.9	378.5	14.19	3.6	-0.1	490	Very dense, Gravelly silty sand to clayey gravelly sand	27-31	+100				+ 95	+ 100
17.0	425.0	445.3	14.33	3.3	-0.1	494	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 95	+ 100
17.5	468.7	489.2	10.13	2.3	-0.0	371	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 96	+ 100
18.0	346.6	360.4	12.05	2.9	-0.0	526	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 96	+ 100
18.5	360.4	373.5	12.55	3.3	-0.1	676	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
19.0	371.4	383.5	15.11	4.0	-0.1	565	Hard, Gravelly clayey sand to gravelly sandy clay			33	22.44	30.23	+ 97	+ 100
19.5	381.9	392.9	7.82	1.8	-0.1	585	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 97	+ 100
20.0	521.1	534.2	6.74	1.3	-0.1	198	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 98	+ 100
20.5	514.4	525.6	12.73	2.4	-0.1	524	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 98	+ 100
21.0	469.4	478.0	11.52	2.3	-0.1	582	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 98	+ 100
21.5	340.2	345.3	10.39	2.5	-0.1	571	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 99	+ 100
22.0	95.1	96.2	5.65	3.0	-0.1	474	Hard, Sandy silt to sandy clay			30	6.25	11.30	40 - 59	40 - 60
22.5	84.9	85.6	6.65	7.0	-0.1	436	Hard, Sandy clay to silty clay **			30	5.57	13.30	+ 99	+ 100
23.0	91.7	92.2	7.26	6.7	-0.0	238	Hard, Sandy clay to silty clay **			33	5.47	14.52	+ 99	+ 100
23.5	147.8	148.1	9.45	5.6	-0.1	393	Hard, Hardpan to weak rock			33	8.87	18.90	+ 100	+ 100
24.0	199.9	199.7	12.14	5.7	-0.0	337	Hard, Gravelly sandy clay to hardpan **			33	12.03	24.28	+ 100	+ 100
24.5	239.6	238.5	16.20	6.7	-0.1	421	Hard, Hardpan to weak rock			33	14.43	32.40	+ 100	+ 100
25.0	243.1	241.3	17.00	6.1	-0.1	453	Hard, Gravelly sandy clay to hardpan **			33	14.64	34.00	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:10:34:45.77

SOUNDING NUMBER:CP-018

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	273.2	270.3	18.92	6.8	-0.1	475	Hard, Hardpan to weak rock			33	16.46	37.83	+ 101	+ 100
26.0	284.0	280.2	17.25	6.1	-0.1	546	Hard, Gravelly sandy clay to hardpan **			33	17.12	34.50	+ 101	+ 100
26.5	274.9	270.4	18.38	6.4	-0.1	507	Hard, Hardpan to weak rock			33	16.57	36.75	+ 102	+ 100
27.0	249.1	244.3	17.39	6.6	-0.1	459	Hard, Hardpan to weak rock			33	15.00	34.78	+ 102	+ 100
27.5	307.9	301.1	21.06	6.2	0.0	447	Hard, Gravelly sandy clay to hardpan **			33	18.56	42.12	+ 102	+ 100

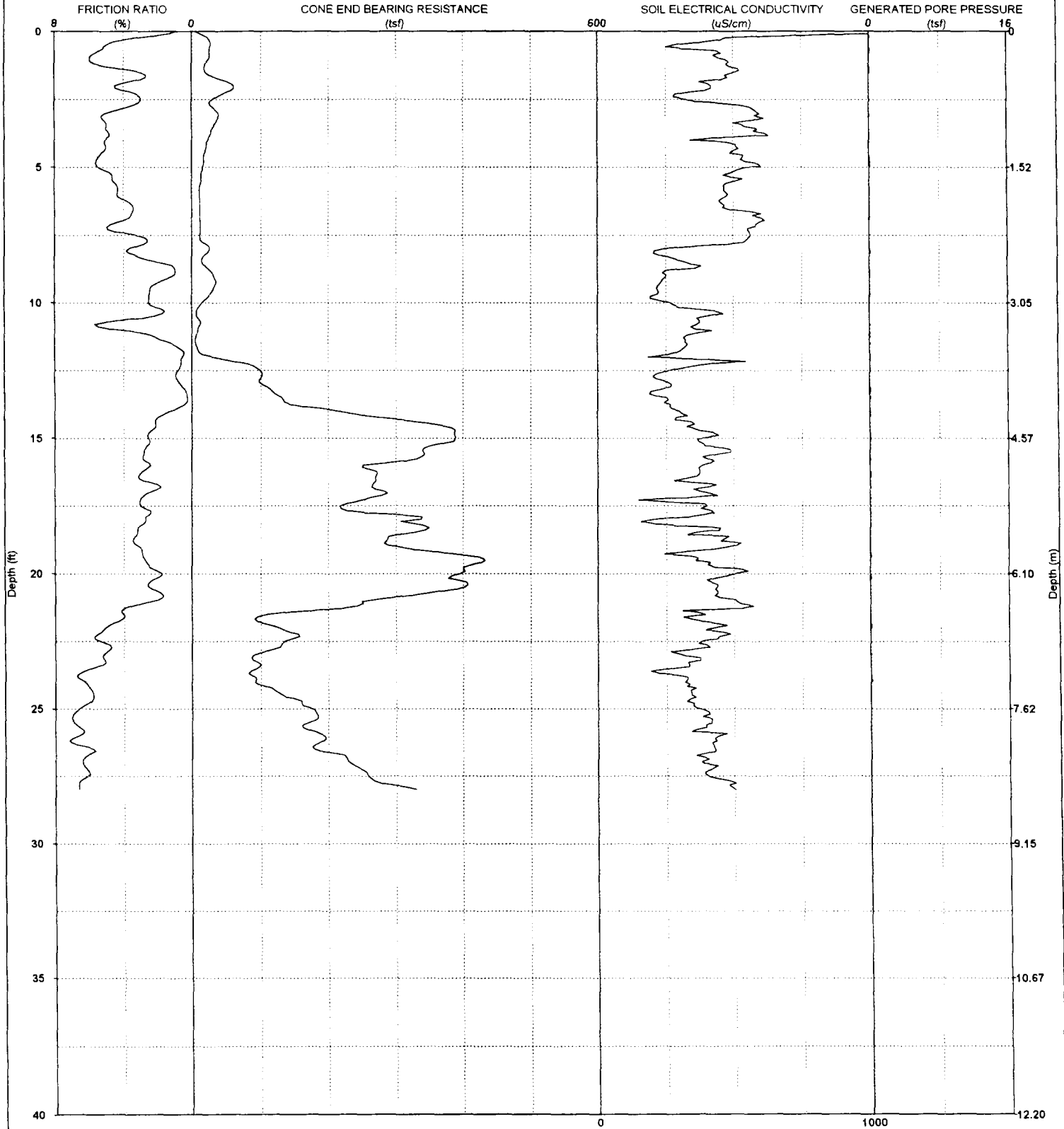
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\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
Both undrained and drained parameters can be estimated for these soils.

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Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:11:09:16.68

SOUNDING NUMBER:CP-019

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	24.1	38.8	1.58	6.3	-0.1	496	Stiff, Sandy clay to silty clay **			25	1.92	3.16	19 - 25	30 - 40
1.5	20.3	30.8	1.18	3.1	0.0	506	Very stiff, Sandy clay to silty clay *			20	2.02	2.37	07 - 10	10 - 15
2.0	61.5	89.8	2.30	4.5	0.0	419	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.09	4.60	41 - 68	60 - 99
2.5	30.2	42.6	1.42	3.0	0.0	328	Very stiff, Sandy silt to sandy clay			25	2.40	2.85	11 - 14	15 - 20
3.0	38.4	52.7	1.79	4.9	0.0	593	Very stiff, Sandy clay to silty clay **			25	3.06	3.57	29 - 44	40 - 60
3.5	32.0	42.9	1.81	5.0	-0.0	542	Very stiff, Silty clay to clay *			25	2.55	3.62	22 - 30	30 - 40
4.0	24.0	31.5	1.39	5.1	0.0	343	Stiff, Silty clay to clay *			25	1.90	2.78	15 - 23	20 - 30
4.5	18.5	23.7	1.11	5.3	-0.0	502	Stiff, Silty clay to clay *			20	1.82	2.21	12 - 16	15 - 20
5.0	15.5	19.6	0.94	5.5	0.0	571	Stiff, Silty clay to clay *			20	1.52	1.87	08 - 12	10 - 15
5.5	13.7	17.0	0.64	4.6	0.0	516	Stiff, Silty clay to clay *			15	1.78	1.27	05 - 08	06 - 10
6.0	11.2	13.7	0.52	4.4	0.0	482	Stiff, Silty clay to clay *			15	1.44	1.04	03 - 05	04 - 06
6.5	11.1	13.4	0.39	3.4	0.0	468	Stiff, Silty clay to clay *			15	1.43	0.78	03 - 05	04 - 06
7.0	12.2	14.5	0.51	4.2	0.0	607	Stiff, Silty clay to clay *			15	1.57	1.02	05 - 08	06 - 10
7.5	11.7	13.8	0.53	3.3	-0.0	564	Stiff, Silty clay to clay *			15	1.51	1.05	03 - 05	04 - 06
8.0	25.5	29.5	0.74	3.7	-0.0	245	Very stiff, Sandy clay to silty clay *			20	2.50	1.48	09 - 13	10 - 15
8.5	14.4	16.6	0.44	1.9	-0.0	328	Stiff, Sandy silt to clayey silt			15	1.86	0.88	02 - 03	02 - 04
9.0	31.9	36.2	0.34	1.1	0.0	251	Loose, Silty sand to sandy silt	36-37	20-40				05 - 09	06 - 10
9.5	30.7	34.4	0.82	2.5	-0.0	217	Very stiff, Sandy silt to sandy clay			20	3.01	1.63	09 - 13	10 - 15
10.0	14.6	16.2	0.61	2.5	0.0	265	Stiff, Sandy clay to silty clay *			15	1.86	1.22	04 - 05	04 - 06
10.5	6.7	7.4	0.22	2.3	-0.0	397	Stiff, Clayey silt to silty clay			10	1.20	0.43	00 - 02	00 - 02
11.0	8.5	9.3	0.44	4.3	-0.0	390	Stiff, Silty clay to clay *			15	1.04	0.87	04 - 05	04 - 06
11.5	5.0	5.5	0.13	1.3	0.1	329	Soft, Clayey silt to silty clay			18	0.48	0.27	00 - 02	00 - 02
12.0	29.3	32.0	0.49	0.6	0.1	184	Loose, Silty sand to sandy silt	36-37	20-40				04 - 06	04 - 06
12.5	98.9	107.4	0.88	0.9	0.0	260	Medium dense, Sand to silty sand	40-42	40-60				18 - 28	20 - 30
13.0	100.9	109.1	0.82	0.7	0.0	268	Medium dense, Sand to silty sand	40-42	40-60				18 - 28	20 - 30
13.5	130.1	140.1	0.45	0.3	0.0	243	Medium dense, Sand to silty sand	42-46	40-80				19 - 28	20 - 30
14.0	214.3	229.8	3.43	1.2	0.1	301	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
14.5	359.0	383.5	8.09	2.1	-0.0	350	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 94	+ 100
15.0	389.0	413.8	9.89	2.6	0.0	388	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 94	+ 100
15.5	341.2	361.6	10.12	2.8	-0.0	490	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 94	+ 100
16.0	252.1	266.1	7.34	2.4	-0.0	385	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 95	+ 100
16.5	270.0	284.0	8.49	3.1	-0.0	313	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 95	+ 100
17.0	285.9	299.6	6.97	2.5	-0.0	393	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 95	+ 100
17.5	219.6	229.2	8.24	3.0	0.0	399	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 96	+ 100
18.0	337.5	351.0	9.08	2.7	0.0	205	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 96	+ 100
18.5	323.2	334.9	10.61	3.2	0.0	353	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
19.0	298.1	307.7	11.36	3.1	-0.0	491	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
19.5	432.0	444.4	11.47	2.8	0.0	361	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 97	+ 100
20.0	396.0	406.0	6.56	1.8	-0.0	505	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 98	+ 100
20.5	400.6	409.3	10.19	2.5	-0.0	439	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 98	+ 100
21.0	258.1	262.8	7.16	2.2	0.0	509	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 98	+ 100
21.5	115.9	117.6	8.25	4.0	-0.0	389	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.94	16.50	+ 99	+ 100
22.0	126.1	127.5	7.31	5.1	0.1	428	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.56	14.62	+ 99	+ 100
22.5	135.3	136.4	7.63	5.4	-0.0	379	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.12	15.26	+ 99	+ 100
23.0	91.8	92.3	6.17	5.2	0.0	311	Hard, Sandy clay to silty clay **			30	6.03	12.34	+ 99	+ 100
23.5	94.4	94.6	5.49	5.9	-0.0	280	Hard, Sandy clay to silty clay **			30	6.20	10.97	+ 100	+ 100
24.0	91.3	91.2	6.98	6.3	0.0	319	Hard, Sandy clay to silty clay **			30	5.99	13.96	+ 100	+ 100
24.5	133.0	132.4	9.01	5.8	-0.0	347	Hard, Hardpan to weak rock			33	7.97	18.02	+ 100	+ 100
25.0	176.5	175.2	11.91	6.6	0.0	375	Hard, Hardpan to weak rock			33	10.61	23.83	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:11:09:16.68

SOUNDING NUMBER:CP-019

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	172.8	171.0	12.50	6.9	-0.0	417	Hard, Hardpan to weak rock			33	10.38	24.99	+ 101	+ 100
26.0	195.3	192.7	12.46	6.7	-0.0	441	Hard, Hardpan to weak rock			33	11.74	24.92	+ 101	+ 100
26.5	181.1	178.1	11.77	5.8	-0.0	429	Hard, Hardpan to weak rock			33	10.88	23.54	+ 102	+ 100
27.0	231.9	227.5	15.86	6.4	-0.0	384	Hard, Hardpan to weak rock			33	13.96	31.72	+ 102	+ 100
27.5	258.5	252.8	17.12	6.1	-0.0	402	Hard, Gravelly sandy clay to hardpan **			33	15.57	34.25	+ 102	+ 100
28.0	329.8	321.5	20.15	6.7	0.0	504	Hard, Hardpan to weak rock			33	19.89	40.30	+ 103	+ 100

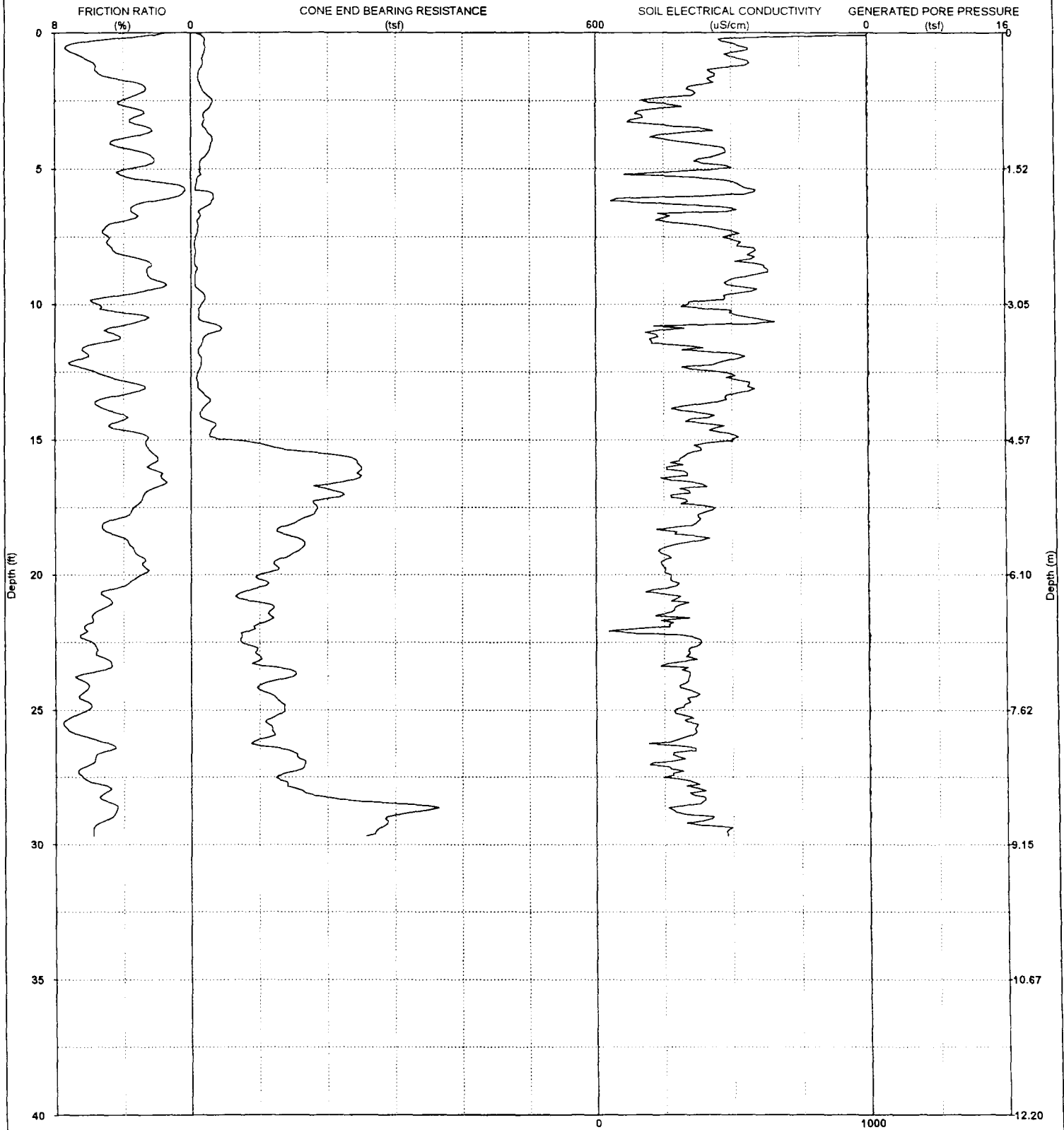
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:11:43.02.44

SOUNDING NUMBER:CP-020

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
1.0	17.9	28.9	1.07	5.9	0.1	593	Stiff, Silty clay to clay *			25	1.43	2.15	12 - 19	20 - 30
1.5	10.6	16.2	0.77	5.5	0.0	438	Stiff, Silty clay to clay *			15	1.40	1.53	07 - 10	10 - 15
2.0	14.9	21.7	0.58	2.7	0.0	343	Stiff, Sandy clay to silty clay *			20	1.47	1.16	04 - 07	06 - 10
2.5	31.1	44.0	1.08	4.1	-0.0	175	Very stiff, Sandy clay to silty clay *			25	2.48	2.16	14 - 21	20 - 30
3.0	17.4	23.9	0.70	2.8	0.1	159	Stiff, Sandy clay to silty clay *			20	1.73	1.39	04 - 07	06 - 10
3.5	19.5	26.1	0.63	2.5	-0.0	365	Stiff, Sandy silt to sandy clay			20	1.93	1.25	04 - 07	06 - 10
4.0	30.7	40.3	1.34	4.7	0.0	309	Very stiff, Silty clay to clay *			25	2.44	2.68	15 - 23	20 - 30
4.5	21.4	27.5	0.83	2.4	-0.0	450	Very stiff, Sandy silt to sandy clay			20	2.12	1.26	05 - 08	06 - 10
5.0	12.0	15.1	0.55	3.8	0.0	464	Stiff, Silty clay to clay *			15	1.56	1.10	03 - 05	04 - 06
5.5	7.6	9.4	0.21	1.7	-0.0	513	Stiff, Sandy silt to clayey silt			10	1.45	0.43	00 - 02	00 - 02
6.0	32.3	39.4	0.14	0.7	0.0	383	Loose, Silty sand to sandy silt	36-37	20-40	15	1.62	1.84	03 - 05	04 - 06
6.5	12.5	15.1	0.92	3.6	0.0	513	Stiff, Silty clay to clay *			15	1.20	1.04	03 - 05	04 - 06
7.0	9.4	11.2	0.52	4.7	-0.0	314	Stiff, Silty clay to clay *			10	1.10	0.82	02 - 03	02 - 04
7.5	6.0	7.0	0.41	4.9	0.0	478	Stiff, Clay			10	1.10	0.50	02 - 03	02 - 04
8.0	6.0	6.9	0.25	4.6	-0.0	591	Stiff, Clay			10	0.93	0.27	00 - 02	00 - 02
8.5	5.1	5.9	0.13	2.3	0.0	596	Firm, Clayey silt to silty clay			10	0.93	0.34	00 - 02	00 - 02
9.0	5.2	5.9	0.17	2.4	-0.0	530	Firm, Clayey silt to silty clay			15	1.67	0.90	04 - 05	04 - 06
9.5	13.1	14.7	0.45	2.6	-0.0	579	Stiff, Clayey silt to silty clay			15	1.79	1.80	05 - 09	06 - 10
10.0	14.0	15.8	0.90	5.5	-0.0	342	Stiff, Silty clay to clay *			15	1.32	1.37	02 - 04	02 - 04
10.5	10.5	11.7	0.88	2.5	0.0	576	Stiff, Clayey silt to silty clay			25	2.97	3.08	27 - 36	30 - 40
11.0	37.8	41.6	1.54	5.0	-0.0	205	Very stiff, Silty clay to clay *			15	1.90	2.53	09 - 14	10 - 15
11.5	15.0	16.4	1.27	5.9	0.0	287	Stiff, Silty clay to clay *			14	2.06	1.68	09 - 14	10 - 15
12.0	15.1	16.5	0.84	6.4	-0.0	526	Very stiff, Silty clay to clay *			15	1.21	1.50	08 - 09	06 - 10
12.5	9.9	10.7	0.75	5.6	0.0	454	Stiff, Silty clay to clay *			15	1.17	0.90	02 - 04	02 - 04
13.0	9.5	10.3	0.45	2.9	-0.0	561	Stiff, Clayey silt to silty clay			25	2.10	2.22	19 - 28	20 - 30
13.5	27.1	29.2	1.11	5.3	0.0	481	Very stiff, Silty clay to clay *			15	1.71	2.06	06 - 09	06 - 10
14.0	13.7	14.7	1.03	4.4	-0.0	389	Stiff, Silty clay to clay *			25	2.75	3.28	19 - 28	20 - 30
14.5	35.2	37.6	1.64	4.8	0.0	464	Very stiff, Silty clay to clay *			25	4.40	6.14	19 - 28	20 - 30
15.0	55.8	59.4	3.07	2.6	0.0	503	Hard, Sandy silt to sandy clay							
15.5	189.2	200.6	5.25	2.3	-0.0	344	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+ 94	+ 100
16.0	249.7	263.6	6.66	2.6	0.0	260	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 95	+ 100
16.5	233.7	245.7	3.45	1.6	-0.0	299	Very dense, Sand to silty sand	42-46	80-100				57 - 94	60 - 99
17.0	224.2	234.9	5.82	2.8	-0.0	312	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 95	+ 100
17.5	185.6	193.8	6.62	3.4	-0.0	429	Hard, Gravelly clayey sand to gravelly sandy silt			33	11.19	13.25	+ 96	+ 100
18.0	157.6	163.9	8.90	4.9	0.0	376	Hard, Gravelly sandy clay to hardpan **			33	9.48	17.80	+ 96	+ 100
18.5	138.2	143.2	7.26	4.6	-0.0	311	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.31	14.52	+ 97	+ 100
19.0	163.4	168.8	5.45	3.4	0.0	247	Hard, Gravelly clayey sand to gravelly sandy silt			33	9.84	10.89	+ 97	+ 100
19.5	124.1	127.7	3.90	2.7	-0.0	243	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	80-100				58 - 96	60 - 99
20.0	98.4	100.9	3.62	2.9	-0.0	276	Hard, Sandy silt to sandy clay			30	6.48	7.24	39 - 59	40 - 60
20.5	94.7	96.7	4.57	4.5	0.0	249	Hard, Gravelly sandy clay to gravelly silty clay **			30	6.23	9.13	+ 98	+ 100
21.0	93.8	95.6	5.26	4.7	0.0	309	Hard, Gravelly sandy clay to gravelly silty clay **			30	6.17	10.51	+ 98	+ 100
21.5	115.2	116.9	6.69	5.9	0.0	227	Hard, Sandy clay to silty clay **			33	6.90	13.39	+ 99	+ 100
22.0	93.8	94.8	6.47	6.3	0.0	139	Hard, Sandy clay to silty clay **			33	5.60	12.94	+ 99	+ 100
22.5	73.2	73.8	5.15	5.9	0.0	384	Hard, Sandy clay to silty clay **			30	4.79	10.30	+ 99	+ 100
23.0	99.9	100.4	5.98	5.5	0.0	336	Hard, Sandy clay to silty clay **			33	5.97	11.96	+ 99	+ 100
23.5	142.1	142.4	6.79	5.0	0.0	321	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.53	13.57	+ 100	+ 100
24.0	106.8	106.7	8.51	6.2	-0.0	329	Hard, Sandy clay to silty clay **			33	6.39	17.02	+ 100	+ 100
24.5	122.8	122.3	8.92	6.7	-0.0	358	Hard, Hardpan to weak rock			33	7.35	17.85	+ 100	+ 100
25.0	137.0	136.0	8.12	6.2	0.1	289	Hard, Hardpan to weak rock			33	8.21	16.24	+ 101	+ 100

\* Indicates lightly overconsolidated soil

\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME: ECC 21-6585B

PROJECT NUMBER: 02-120-080

R2DATE: 5-22-2002 TIME: 11:43:02.44

SOUNDING NUMBER: CP-020

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	112.0	110.9	9.32	7.6	-0.0	364	Hard, Hardpan to weak rock			24	9.21	18.65	+ 101	+ 100
26.0	113.2	111.7	7.16	6.1	-0.0	323	Hard, Sandy clay to silty clay **			33	6.77	14.32	+ 101	+ 100
26.5	146.6	144.2	7.94	5.0	-0.0	343	Hard, Gravelly sandy clay to gravelly silty clay **			33	8.79	15.87	+ 102	+ 100
27.0	167.4	164.2	9.28	5.9	0.0	201	Hard, Hardpan to weak rock			33	10.05	18.56	+ 102	+ 100
27.5	125.5	122.7	9.65	6.5	-0.0	258	Hard, Hardpan to weak rock			33	7.50	19.30	+ 102	+ 100
28.0	164.8	160.7	10.49	4.9	0.1	402	Hard, Gravelly sandy clay to gravelly silty clay **			33	9.89	20.98	+ 103	+ 100
28.5	317.6	308.8	14.48	4.5	-0.0	364	Hard, Gravelly clayey sand to gravelly sandy clay			33	19.15	28.96	+ 103	+ 100
29.0	286.2	277.5	15.51	4.8	0.0	426	Hard, Gravelly sandy clay to hardpan **			33	17.24	31.02	+ 103	+ 100
29.5	272.0	262.9	17.70	5.8	0.0	479	Hard, Gravelly sandy clay to hardpan **			33	16.38	35.40	+ 103	+ 100

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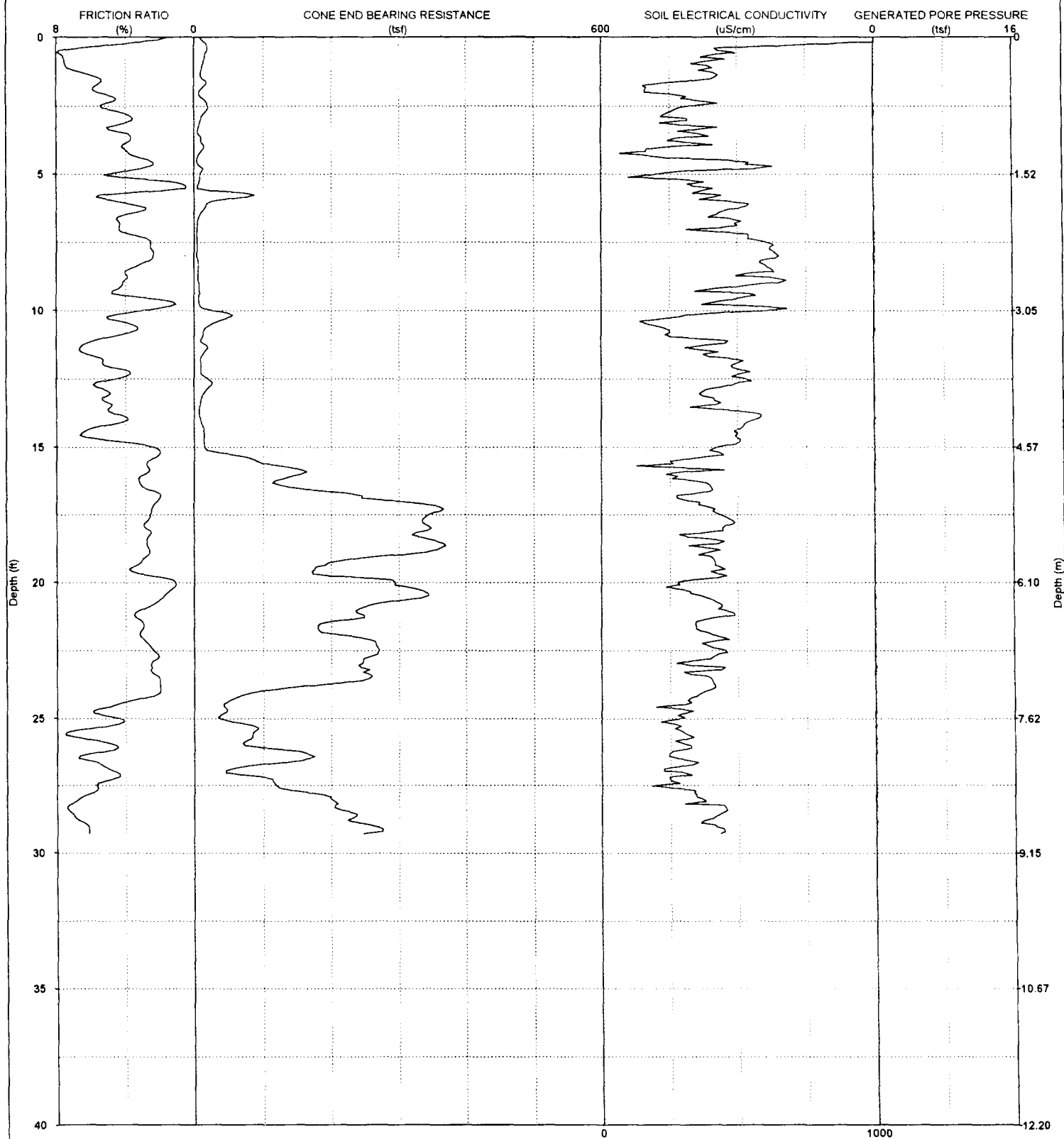
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME: ECC 21-6585B

PROJECT NUMBER: 02-120-080

R2DATE: 5-22-2002 TIME: 12:44:55.30

SOUNDING NUMBER: CP-021

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
1.0	11.3	18.1	1.15	8.0	-0.0	487	Stiff, Silty clay to clay *			14	1.80	2.31	09 - 12	15 - 20
1.5	11.5	17.6	0.69	5.5	0.0	408	Stiff, Silty clay to clay *			15	1.52	1.38	07 - 10	10 - 15
2.0	6.9	10.1	0.76	5.6	-0.0	160	Firm, Silty clay to clay *			15	0.91	1.52	03 - 04	04 - 06
2.5	19.8	27.9	0.86	5.4	0.1	329	Stiff, Silty clay to clay *			20	1.96	1.71	14 - 21	20 - 30
3.0	8.8	12.0	0.50	3.6	0.0	317	Stiff, Silty clay to clay *			15	1.14	1.00	03 - 04	04 - 06
3.5	5.2	7.0	0.38	4.0	0.0	343	Firm, Silty clay to clay			10	1.00	0.75	00 - 01	00 - 02
4.0	14.1	18.5	0.45	4.2	0.0	241	Stiff, Silty clay to clay *			15	1.85	0.90	05 - 08	06 - 10
4.5	3.2	4.1	0.21	2.6	0.0	470	Soft, Silty clay to clay			18	0.32	0.42	00 - 02	00 - 02
5.0	8.1	10.3	0.41	5.0	0.0	201	Stiff, Silty clay to clay *			15	1.05	0.82	03 - 05	04 - 06
5.5	4.5	5.6	0.20	0.5	0.0	393	Soft, Sensitive fine grained soil			18	0.46	0.40	00 - 02	00 - 02
6.0	23.7	28.9	2.14	4.5	-0.0	475	Very stiff, Silty clay to clay *			20	2.33	4.28	12 - 16	15 - 20
6.5	7.5	9.0	0.59	4.1	0.0	416	Firm, Silty clay to clay			15	0.95	1.18	02 - 03	02 - 04
7.0	4.0	4.7	0.23	4.4	0.0	378	Soft, Clay			18	0.40	0.46	00 - 02	00 - 02
7.5	4.2	5.0	0.09	2.5	0.0	603	Soft, Silty clay to clay			18	0.42	0.19	00 - 02	00 - 02
8.0	3.1	3.6	0.12	2.4	0.1	653	Soft, Silty clay to clay			18	0.29	0.24	00 - 02	00 - 02
8.5	5.2	5.9	0.20	3.8	0.0	628	Firm, Silty clay to clay			10	0.94	0.40	00 - 02	00 - 02
9.0	6.1	6.9	0.28	4.2	0.0	608	Stiff, Silty clay to clay			10	1.11	0.56	00 - 02	00 - 02
9.5	6.1	6.8	0.32	3.4	0.0	528	Stiff, Silty clay to clay			10	1.10	0.65	00 - 02	00 - 02
10.0	26.9	29.9	1.29	3.0	0.0	612	Very stiff, Sandy clay to silty clay *			20	2.63	2.58	09 - 14	10 - 15
10.5	24.8	27.5	1.50	3.7	0.0	172	Very stiff, Sandy clay to silty clay *			20	2.42	2.99	09 - 14	10 - 15
11.0	11.5	12.6	0.78	5.1	0.0	309	Stiff, Silty clay to clay *			15	1.44	1.57	05 - 09	06 - 10
11.5	15.2	16.7	0.87	6.6	-0.0	414	Very stiff, Silty clay to clay *			14	2.08	1.95	09 - 14	10 - 15
12.0	9.6	10.5	0.63	5.3	-0.0	477	Stiff, Silty clay to clay *			15	1.19	1.26	04 - 06	04 - 06
12.5	20.6	22.4	0.95	4.6	0.0	535	Stiff, Silty clay to clay *			20	1.98	1.90	09 - 14	10 - 15
13.0	14.2	15.3	1.00	4.9	0.0	365	Stiff, Silty clay to clay *			15	1.79	2.00	06 - 09	06 - 10
13.5	7.2	7.7	0.47	4.8	0.0	348	Stiff, Clay			10	1.27	0.94	02 - 04	02 - 04
14.0	9.3	9.9	0.45	3.8	0.1	558	Stiff, Silty clay to clay *			15	1.12	0.90	02 - 04	02 - 04
14.5	14.0	15.0	0.94	6.6	0.0	499	Stiff, Silty clay to clay *			14	1.88	1.89	09 - 14	10 - 15
15.0	15.3	16.2	1.10	2.4	0.0	426	Stiff, Clayey silt to silty clay			15	1.91	2.20	04 - 06	04 - 06
15.5	89.7	95.1	3.54	2.7	0.1	268	Very dense, Silty sand to sandy silt	36-37	80-100				38 - 57	40 - 60
16.0	156.0	164.7	3.91	2.9	-0.0	237	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+95	+100
16.5	144.5	152.0	6.55	2.9	0.0	403	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+95	+100
17.0	295.4	309.5	7.53	2.2	0.0	332	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+95	+100
17.5	344.7	359.8	8.82	2.6	0.0	435	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+96	+100
18.0	348.6	362.5	9.61	2.6	0.0	444	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+96	+100
18.5	359.4	372.4	9.71	2.8	0.0	444	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+97	+100
19.0	289.0	298.4	9.35	2.7	0.0	380	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+97	+100
19.5	176.5	181.6	8.46	3.7	-0.0	449	Hard, Gravelly clayey sand to gravelly sandy silt			33	10.62	16.91	+97	+100
20.0	294.9	302.3	3.50	1.1	0.0	276	Dense, Sand to silty sand	42-46	60-80				59 - 97	60 - 99
20.5	341.6	349.0	5.76	1.8	0.1	372	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+98	+100
21.0	238.6	243.0	8.63	3.1	0.0	442	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+98	+100
21.5	187.2	190.0	6.83	3.0	0.0	343	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+99	+100
22.0	237.7	240.4	8.17	3.1	0.0	437	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+99	+100
22.5	270.1	272.3	6.26	2.4	0.0	453	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+99	+100
23.0	242.9	244.1	6.64	2.5	0.0	298	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+99	+100
23.5	257.7	258.1	5.03	2.0	-0.0	398	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+100	+100
24.0	94.8	94.6	3.55	2.0	0.0	375	Dense, Silty sand to sandy silt	37-40	60-80				30 - 40	30 - 40
24.5	42.0	41.9	2.83	4.6	-0.0	276	Very stiff, Silty clay to clay *			25	3.25	5.66	20 - 30	20 - 30
25.0	36.9	36.7	3.03	4.4	0.0	289	Very stiff, Silty clay to clay *			25	2.83	6.06	20 - 30	20 - 30

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:12:44:55.30

SOUNDING NUMBER:CP-021

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	86.7	85.8	6.05	7.4	-0.0	296	Hard, Sandy clay to silty clay **			24	7.10	12.11	+ 101	+ 100
26.0	72.9	71.9	6.18	4.6	0.0	325	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.75	12.36	41 - 61	40 - 60
26.5	165.0	162.3	9.38	6.6	0.0	289	Hard, Hardpan to weak rock			33	9.91	18.76	+ 102	+ 100
27.0	45.2	44.4	4.70	4.6	-0.0	264	Very stiff, Silty clay to clay *			25	3.49	9.41	20 - 31	20 - 30
27.5	118.5	115.9	9.14	5.7	0.0	207	Hard, Sandy clay to silty clay **			33	7.08	18.28	+ 102	+ 100
28.0	200.4	195.4	14.15	6.7	-0.0	370	Hard, Hardpan to weak rock			33	12.05	28.30	+ 103	+ 100
28.5	230.6	224.2	17.09	7.2	0.0	442	Hard, Hardpan to weak rock			33	13.87	34.19	+ 103	+ 100
29.0	263.8	255.8	17.60	6.2	0.0	416	Hard, Gravelly sandy clay to hardpan **			33	15.88	35.20	+ 103	+ 100

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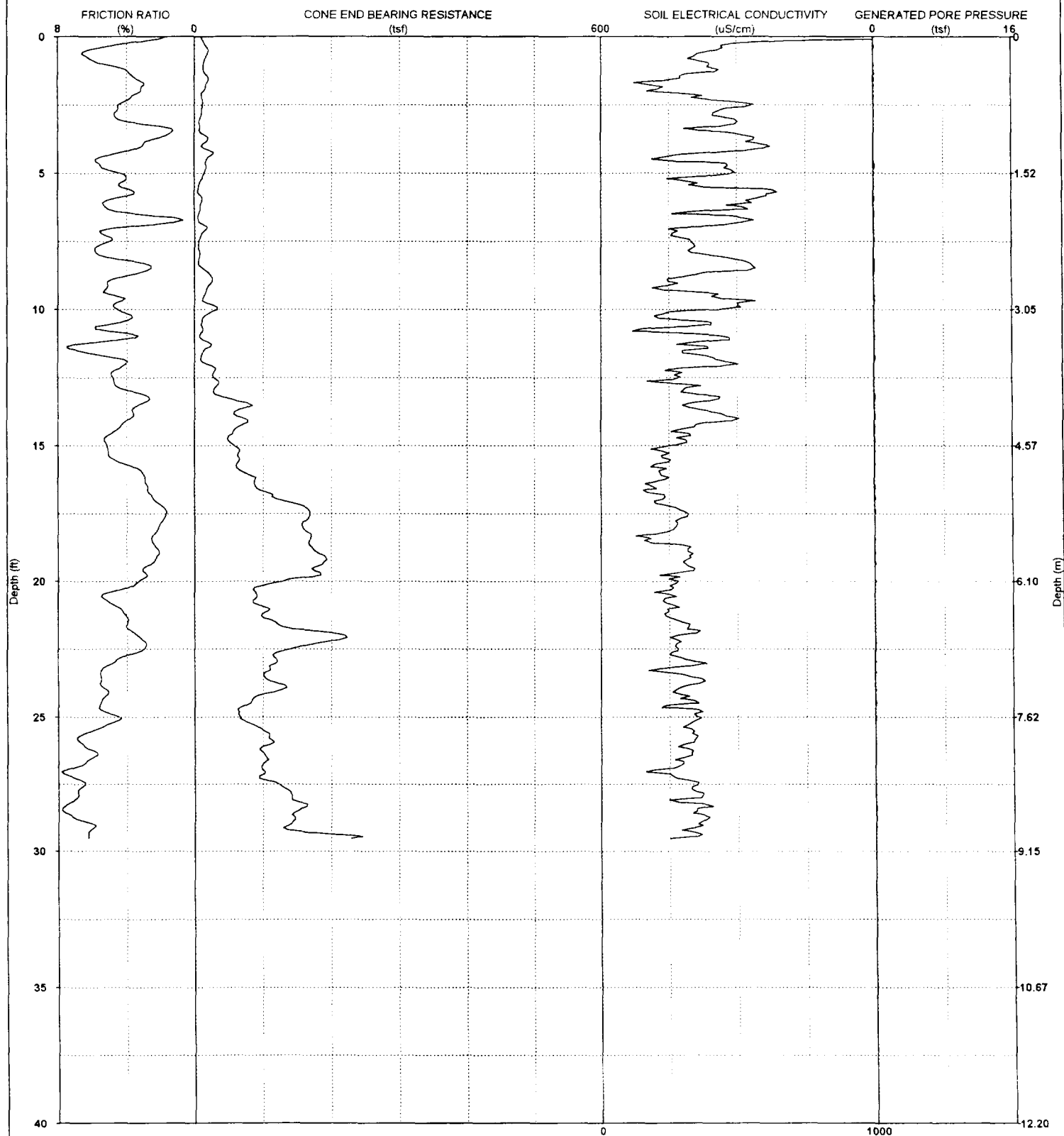
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# CPT-EC LOG





**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:13:18:58.58

SOUNDING NUMBER:CP-022

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	11.8	19.0	0.73	5.2	-0.0	327	Stiff, Silty clay to clay *			20	1.17	1.47	06 - 09	10 - 15
1.5	20.4	31.1	0.62	3.5	0.0	293	Very stiff, Sandy clay to silty clay *			20	2.03	1.23	07 - 10	10 - 15
2.0	12.8	18.7	0.50	3.1	0.0	172	Stiff, Sandy clay to silty clay *			15	1.69	1.00	04 - 07	06 - 10
2.5	11.3	16.0	0.50	4.5	0.0	556	Stiff, Silty clay to clay *			15	1.49	1.00	04 - 07	06 - 10
3.0	7.5	10.3	0.44	4.5	0.0	477	Firm, Silty clay to clay *			15	0.97	0.88	03 - 04	04 - 06
3.5	8.5	11.4	0.20	1.4	0.0	448	Stiff, Sandy silt to clayey silt			15	1.11	0.41	00 - 01	00 - 02
4.0	9.0	11.8	0.58	3.1	0.0	623	Stiff, Clayey silt to silty clay			15	1.17	1.12	02 - 03	02 - 04
4.5	16.8	21.6	1.20	5.8	0.0	211	Stiff, Silty clay to clay *			20	1.65	2.39	12 - 16	15 - 20
5.0	13.3	16.8	0.66	4.4	-0.0	482	Stiff, Silty clay to clay *			15	1.74	1.32	05 - 08	06 - 10
5.5	5.2	6.4	0.40	4.3	-0.0	365	Firm, Silty clay to clay			10	0.97	0.79	00 - 02	00 - 02
6.0	10.5	12.9	0.44	5.2	0.0	535	Stiff, Silty clay to clay *			15	1.35	0.88	05 - 08	06 - 10
6.5	5.2	6.3	0.30	3.3	0.1	319	Firm, Silty clay to clay			10	0.96	0.60	00 - 02	00 - 02
7.0	17.9	21.3	0.50	4.5	-0.0	310	Stiff, Silty clay to clay *			20	1.75	1.00	08 - 13	10 - 15
7.5	5.5	6.4	0.51	5.0	0.0	332	Stiff, Clay			10	1.01	1.02	02 - 03	02 - 04
8.0	7.4	8.6	0.39	5.6	-0.0	391	Stiff, Silty clay to clay *			10	1.39	0.78	03 - 05	04 - 06
8.5	12.2	14.0	0.54	2.6	0.0	562	Stiff, Clayey silt to silty clay			15	1.56	1.08	03 - 05	04 - 06
9.0	24.3	27.6	1.12	5.1	-0.0	267	Very stiff, Silty clay to clay *			20	2.38	2.23	13 - 18	15 - 20
9.5	13.1	14.7	0.92	4.7	0.0	415	Stiff, Silty clay to clay *			15	1.67	1.84	05 - 09	06 - 10
10.0	33.1	36.7	0.93	4.5	-0.0	438	Very stiff, Silty clay to clay *			25	2.60	1.86	18 - 27	20 - 30
10.5	9.9	11.0	0.73	4.5	0.0	407	Stiff, Silty clay to clay *			15	1.24	1.46	04 - 05	04 - 06
11.0	6.8	7.5	0.50	3.4	0.0	454	Stiff, Silty clay to clay			10	1.23	0.99	00 - 02	00 - 02
11.5	13.4	14.7	1.13	7.0	0.0	324	Stiff, Silty clay to clay *			14	1.81	2.27	09 - 14	10 - 15
12.0	17.7	19.3	1.10	4.1	0.0	507	Stiff, Silty clay to clay *			20	1.70	2.20	06 - 09	06 - 10
12.5	28.6	31.0	1.48	4.8	-0.0	286	Very stiff, Silty clay to clay *			25	2.22	2.95	14 - 18	15 - 20
13.0	27.0	29.2	1.81	3.7	0.0	299	Very stiff, Sandy clay to silty clay *			20	2.62	3.62	09 - 14	10 - 15
13.5	82.5	88.8	2.21	3.3	-0.0	308	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.45	4.42	37 - 56	40 - 60
14.0	71.4	76.6	2.52	3.8	0.0	506	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.71	5.04	37 - 56	40 - 60
14.5	55.9	59.7	3.26	4.8	0.0	276	Very stiff, Sandy clay to silty clay **			30	3.67	6.51	37 - 56	40 - 60
15.0	58.0	61.7	3.25	5.2	-0.0	257	Very stiff, Sandy clay to silty clay **			30	3.80	6.50	38 - 56	40 - 60
15.5	65.4	69.3	3.11	4.8	0.0	249	Hard, Sandy clay to silty clay **			30	4.30	6.22	38 - 57	40 - 60
16.0	72.9	77.0	2.60	3.1	0.0	216	Hard, Sandy silt to sandy clay			30	4.80	5.20	28 - 38	30 - 40
16.5	89.2	93.8	2.80	2.7	0.0	194	Very dense, Silty sand to sandy silt	36-37	80-100				38 - 57	40 - 60
17.0	126.3	132.4	3.72	2.4	0.0	211	Very dense, Silty sand to sandy silt	37.40	80-100				38 - 57	40 - 60
17.5	169.8	177.3	2.72	1.7	0.0	320	Dense, Sand to silty sand	40-42	60-80				38 - 57	40 - 60
18.0	158.6	165.0	3.59	2.1	0.0	274	Very dense, Silty sand to sandy silt	37.40	80-100				58 - 95	60 - 99
18.5	168.7	174.8	4.37	2.5	0.0	166	Very dense, Gravelly silty sand to clayey gravelly sand	37.40	80-100				+ 97	+ 100
19.0	186.3	192.3	3.96	2.1	0.0	332	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				58 - 96	60 - 99
19.5	174.1	179.1	5.74	3.0	0.0	340	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
20.0	129.4	132.7	5.75	3.3	0.0	284	Hard, Gravelly clayey sand to gravelly sandy silt			30	8.55	11.50	+ 98	+ 100
20.5	91.3	93.3	5.46	5.4	-0.0	257	Hard, Sandy clay to silty clay **			30	6.00	10.92	+ 98	+ 100
21.0	107.1	109.1	4.63	4.4	-0.0	265	Hard, Gravelly sandy clay to gravelly silty clay **			30	7.06	9.25	+ 98	+ 100
21.5	117.1	118.9	6.04	3.9	-0.0	291	Hard, Gravelly clayey sand to gravelly sandy silt			30	7.72	12.09	+ 99	+ 100
22.0	220.9	223.4	6.26	3.4	0.0	281	Hard, Gravelly clayey sand to gravelly sandy silt			33	13.31	12.52	+ 99	+ 100
22.5	140.8	142.0	5.49	3.0	0.0	282	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				60 - 98	60 - 99
23.0	119.7	120.3	5.65	4.8	0.0	368	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.17	11.31	+ 99	+ 100
23.5	101.6	101.8	6.52	5.5	-0.0	320	Hard, Sandy clay to silty clay **			33	6.07	13.05	+ 100	+ 100
24.0	127.6	127.4	6.05	5.2	0.1	276	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.64	12.10	+ 100	+ 100
24.5	79.4	79.1	5.20	5.6	0.0	326	Hard, Sandy clay to silty clay **			30	5.20	10.41	+ 100	+ 100
25.0	65.9	65.4	3.56	4.4	0.0	358	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.30	7.12	40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:13:18:58.58

SOUNDING NUMBER:CP-022

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	101.8	100.7	6.53	6.0	-0.0	339	Hard, Sandy clay to silty clay **			33	6.07	13.06	+ 101	+ 100
26.0	110.1	108.6	7.23	6.6	0.0	301	Hard, Hardpan to weak rock			33	6.58	14.46	+ 101	+ 100
26.5	105.5	103.8	6.17	6.1	-0.0	297	Hard, Sandy clay to silty clay **			33	6.30	12.35	+ 102	+ 100
27.0	101.8	99.8	8.24	7.7	0.0	176	Hard, Hardpan to weak rock			24	8.35	16.48	+ 102	+ 100
27.5	123.8	121.1	8.66	6.5	0.0	353	Hard, Hardpan to weak rock			33	7.41	17.32	+ 102	+ 100
28.0	142.5	139.0	10.65	6.9	0.0	366	Hard, Hardpan to weak rock			33	8.54	21.30	+ 103	+ 100
28.5	150.5	146.4	12.08	7.8	0.0	346	Hard, Hardpan to weak rock			24	12.40	24.16	+ 103	+ 100
29.0	140.4	136.2	9.98	5.9	0.0	363	Hard, Hardpan to weak rock			33	8.41	19.96	+ 103	+ 100
29.5	233.4	225.7	13.76	6.3	-0.0	276	Hard, Hardpan to weak rock			33	14.04	27.52	+ 103	+ 100

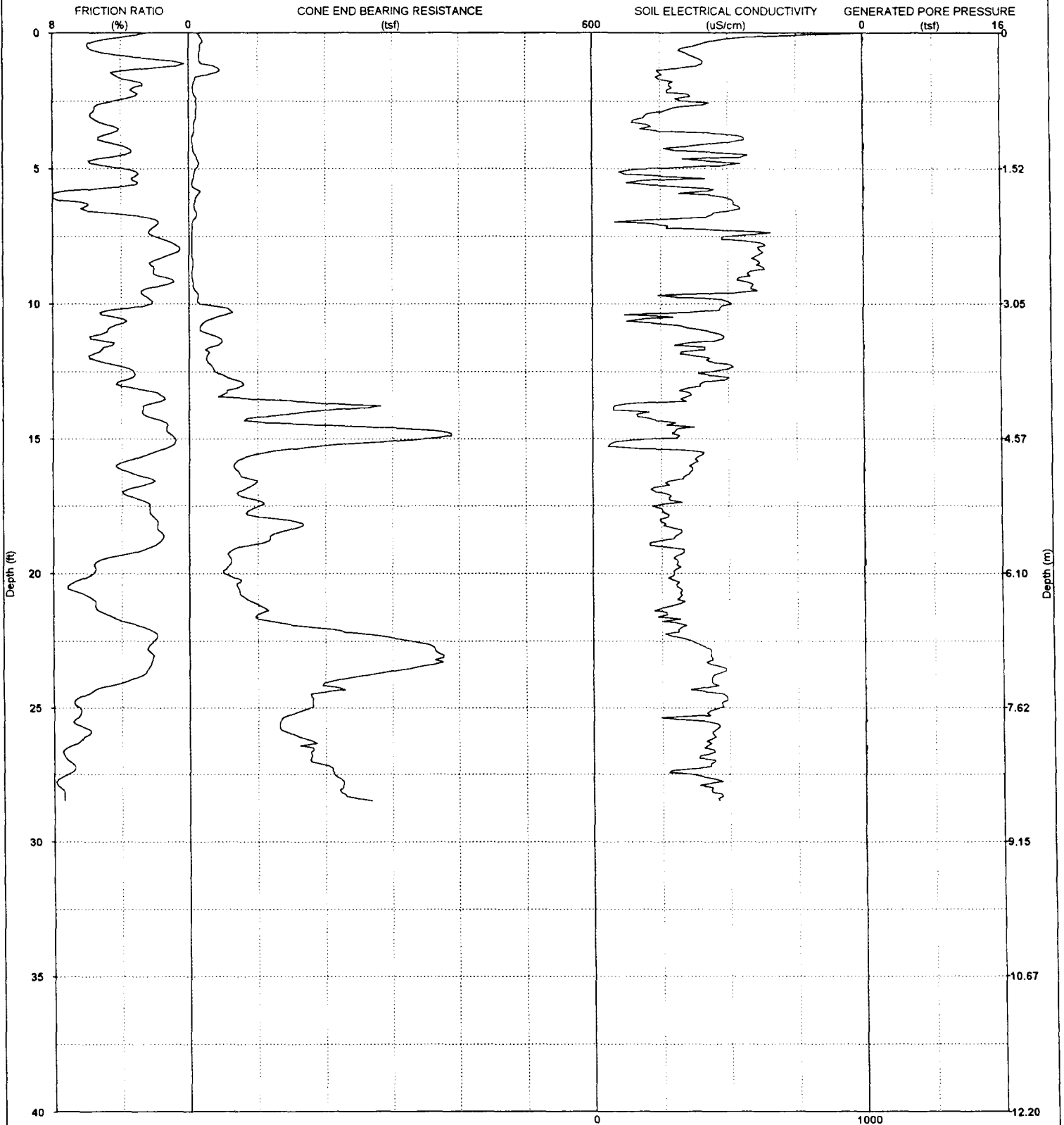
\* Indicates lightly overconsolidated soil

\*\* Indicates heavily overconsolidated or cemented soil

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Both undrained and drained parameters can be estimated for these soils.

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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:13:47:46.43

SOUNDING NUMBER:CP-023

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	-9.3	0.1	0.04	-0.4	0.1	442	Sensitive fine grained soil	K INPUT	K INPUT				K INPUT	K INPUT
1.5	31.0	47.2	1.39	4.4	-0.0	256	Very stiff, Silty clay to clay *			25	2.47	2.79	20 - 26	30 - 40
2.0	5.1	7.5	0.34	3.2	-0.0	296	Stiff, Silty clay to clay			10	1.00	0.68	00 - 01	00 - 02
2.5	10.7	15.1	0.47	4.4	0.0	354	Stiff, Silty clay to clay *			15	1.41	0.94	04 - 07	06 - 10
3.0	10.5	14.4	0.63	5.8	-0.0	199	Stiff, Silty clay to clay *			15	1.37	1.26	04 - 07	06 - 10
3.5	7.1	9.5	0.33	4.2	-0.0	187	Firm, Silty clay to clay *			15	0.91	0.66	03 - 04	04 - 06
4.0	4.1	5.3	0.29	4.9	-0.0	509	Firm, Clay			10	0.77	0.58	00 - 02	00 - 02
4.5	10.0	12.9	0.46	3.9	-0.0	568	Stiff, Silty clay to clay *			15	1.30	0.92	03 - 05	04 - 06
5.0	9.9	12.5	0.46	3.9	-0.0	218	Stiff, Silty clay to clay *			15	1.28	0.93	03 - 05	04 - 06
5.5	4.1	5.1	0.28	3.1	-0.0	142	Soft, Silty clay to clay			18	0.42	0.56	00 - 02	00 - 02
6.0	11.5	14.0	0.92	9.4	-0.0	444	Stiff, Clay to organic soil*			14	1.59	1.84	12 - 16	15 - 20
6.5	8.3	10.0	0.57	6.2	0.0	536	Stiff, Silty clay to clay *			14	1.13	1.14	05 - 08	06 - 10
7.0	4.5	5.3	0.15	1.8	-0.0	147	Soft, Clayey silt to silty clay			18	0.45	0.29	00 - 02	00 - 02
7.5	3.5	4.1	0.09	2.0	-0.0	509	Soft, Clayey silt to silty clay			18	0.33	0.17	00 - 02	00 - 02
8.0	3.2	3.7	0.01	0.6	-0.0	616	Soft, Sensitive fine grained soil			18	0.30	0.02	00 - 02	00 - 02
8.5	6.1	7.0	0.12	2.3	-0.0	616	Stiff, Clayey silt to silty clay			10	1.11	0.23	00 - 02	00 - 02
9.0	3.9	4.4	0.09	1.6	-0.0	561	Soft, Clayey silt to silty clay			18	0.37	0.17	00 - 02	00 - 02
9.5	8.1	9.1	0.34	2.7	-0.0	603	Stiff, Clayey silt to silty clay			10	1.50	0.69	00 - 02	00 - 02
10.0	15.5	17.2	0.95	2.3	-0.0	516	Stiff, Sandy silt to clayey silt			15	1.98	1.90	04 - 05	04 - 06
10.5	38.6	42.7	1.99	4.3	-0.0	266	Very stiff, Sandy clay to silty clay *			25	3.04	3.97	18 - 27	20 - 30
11.0	17.9	19.7	1.74	4.8	0.0	419	Stiff, Silty clay to clay *			20	1.72	3.48	09 - 14	10 - 15
11.5	43.3	47.5	1.71	4.5	0.1	313	Very stiff, Silty clay to clay *			25	3.41	3.42	27 - 37	30 - 40
12.0	24.9	27.2	1.86	5.8	0.0	431	Very stiff, Silty clay to clay *			20	2.42	3.72	18 - 28	20 - 30
12.5	38.4	41.7	1.92	3.2	-0.0	434	Very stiff, Sandy clay to silty clay *			25	3.01	3.85	14 - 18	15 - 20
13.0	78.4	84.8	2.70	4.1	0.0	396	Hard, Gravelly sandy clay to gravelly silty clay **			30	5.17	5.41	55 - 82	60 - 99
13.5	77.7	83.6	2.42	1.4	-0.0	329	Medium dense, Silty sand to sandy silt	37-40	40-60				19 - 28	20 - 30
14.0	166.8	178.8	5.62	2.7	-0.0	208	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 93	+ 100
14.5	205.9	219.9	4.27	1.3	-0.0	297	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
15.0	351.7	374.2	2.78	0.8	-0.0	236	Very dense, Sand to silty sand	42-46	80-100				56 - 93	60 - 99
15.5	115.8	122.8	4.32	2.1	-0.0	393	Dense, Silty sand to sandy silt	37-40	60-80				38 - 57	40 - 60
16.0	65.1	68.7	3.59	4.3	0.0	355	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.27	7.18	38 - 57	40 - 60
16.5	91.1	95.8	1.70	2.2	-0.0	318	Dense, Silty sand to sandy silt	37-40	60-80				29 - 38	30 - 40
17.0	71.3	74.7	3.64	3.9	-0.0	246	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.68	7.29	38 - 57	40 - 60
17.5	103.2	107.7	2.22	2.3	-0.0	226	Dense, Silty sand to sandy silt	37-40	60-80				38 - 57	40 - 60
18.0	132.2	137.5	2.91	1.9	0.0	244	Dense, Silty sand to sandy silt	37-40	60-80				38 - 58	40 - 60
18.5	129.9	134.6	2.48	1.6	-0.0	322	Dense, Silty sand to sandy silt	40-42	60-80				39 - 58	40 - 60
19.0	80.5	83.1	2.38	2.2	0.0	241	Dense, Silty sand to sandy silt	36-37	60-80				19 - 29	20 - 30
19.5	61.1	62.8	3.27	5.2	0.0	304	Very stiff, Sandy clay to silty clay **			30	3.99	6.54	39 - 58	40 - 60
20.0	50.9	52.1	3.74	5.7	-0.0	298	Very stiff, Sandy clay to silty clay **			30	3.31	7.48	39 - 59	40 - 60
20.5	70.4	71.9	5.54	7.2	-0.0	311	Hard, Sandy clay to silty clay **			30	4.61	11.07	+ 98	+ 100
21.0	87.4	89.0	5.73	5.6	-0.0	321	Hard, Sandy clay to silty clay **			30	5.74	11.46	+ 98	+ 100
21.5	101.6	103.2	6.16	5.0	-0.0	268	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.08	12.32	+ 99	+ 100
22.0	182.2	184.3	6.84	2.7	0.0	321	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 99	+ 100
22.5	329.0	331.8	7.51	2.1	0.0	363	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 99	+ 100
23.0	373.7	375.6	7.54	2.2	-0.0	431	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 99	+ 100
23.5	330.5	331.1	8.69	2.4	-0.0	480	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 100	+ 100
24.0	209.5	209.3	9.81	3.6	0.0	436	Hard, Gravelly clayey sand to gravelly sandy silt			33	12.61	19.62	+ 100	+ 100
24.5	178.0	177.2	12.24	6.0	0.0	480	Hard, Hardpan to weak rock			33	10.70	24.47	+ 100	+ 100
25.0	177.3	175.9	11.64	6.5	-0.0	464	Hard, Hardpan to weak rock			33	10.65	23.28	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:13:47:46.43

SOUNDING NUMBER:CP-023

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	133.4	132.0	10.39	6.8	0.0	390	Hard, Hardpan to weak rock			33	7.99	20.78	+ 101	+ 100
26.0	154.5	152.4	10.10	5.9	-0.0	441	Hard, Hardpan to weak rock			33	9.27	20.20	+ 101	+ 100
26.5	181.4	178.4	13.14	7.3	0.1	414	Hard, Hardpan to weak rock			33	10.90	26.28	+ 102	+ 100
27.0	178.2	174.7	14.41	7.2	-0.0	443	Hard, Hardpan to weak rock			33	10.70	28.82	+ 102	+ 100
27.5	213.1	208.4	15.85	7.2	-0.0	342	Hard, Hardpan to weak rock			33	12.82	31.70	+ 102	+ 100
28.0	225.2	219.6	17.76	7.6	-0.0	437	Hard, Hardpan to weak rock			33	13.55	35.52	+ 103	+ 100

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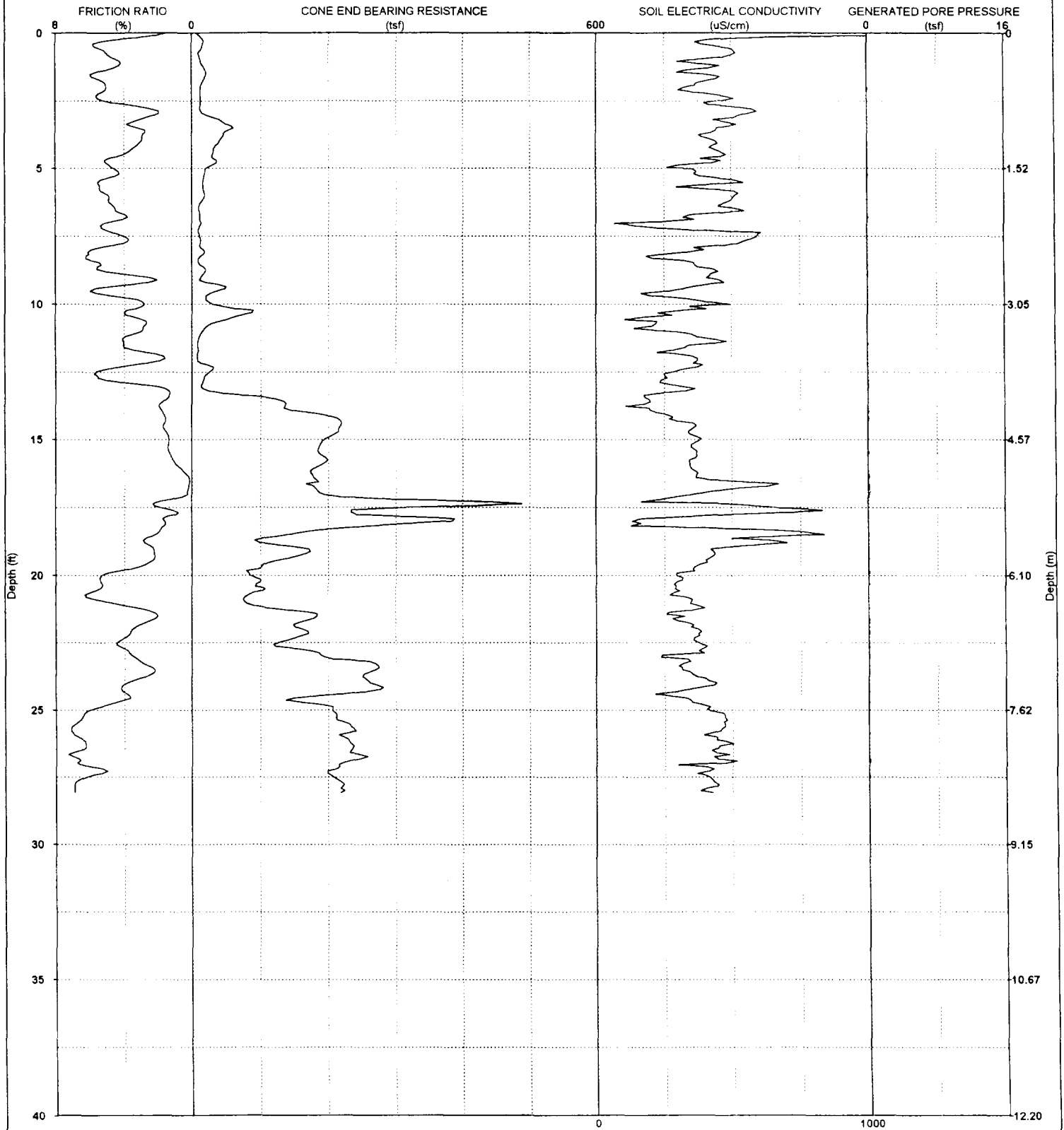
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:14:16:52.07

SOUNDING NUMBER:CP-024

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	10.0	16.1	0.68	4.0	-0.0	245	Stiff, Silty clay to clay *			15	1.32	1.35	04 - 06	06 - 10
1.5	20.4	31.1	1.05	5.9	0.0	382	Stiff, Silty clay to clay *			25	1.63	2.10	13 - 20	20 - 30
2.0	12.6	18.4	0.83	5.0	0.1	324	Stiff, Silty clay to clay *			15	1.66	1.66	07 - 10	10 - 15
2.5	12.7	17.9	0.68	5.1	-0.0	451	Stiff, Silty clay to clay *			15	1.67	1.35	07 - 11	10 - 15
3.0	18.5	25.4	0.81	2.1	-0.0	545	Stiff, Sandy silt to sandy clay			20	1.83	1.61	04 - 07	06 - 10
3.5	59.8	80.0	1.54	3.3	-0.0	457	Very stiff, Sandy silt to sandy clay			30	3.97	3.09	30 - 45	40 - 60
4.0	40.6	53.2	1.43	3.0	-0.0	443	Very stiff, Sandy silt to sandy clay			25	3.23	2.86	15 - 23	20 - 30
4.5	30.0	38.6	1.36	4.1	-0.0	476	Very stiff, Sandy clay to silty clay *			25	2.38	2.72	16 - 23	20 - 30
5.0	21.0	26.5	1.41	4.6	-0.0	311	Very stiff, Silty clay to clay *			20	2.07	2.82	12 - 16	15 - 20
5.5	15.9	19.8	1.00	5.5	-0.0	537	Stiff, Silty clay to clay *			20	1.56	2.00	08 - 12	10 - 15
6.0	18.5	22.5	0.79	4.9	-0.0	514	Stiff, Silty clay to clay *			20	1.81	1.58	08 - 12	10 - 15
6.5	9.7	11.7	0.60	4.5	0.0	525	Stiff, Silty clay to clay *			15	1.25	1.19	03 - 05	04 - 06
7.0	12.5	14.8	0.55	4.9	0.0	156	Stiff, Silty clay to clay *			15	1.61	1.11	05 - 08	06 - 10
7.5	11.3	13.3	0.50	4.1	-0.0	596	Stiff, Silty clay to clay *			15	1.45	1.01	03 - 05	04 - 06
8.0	16.5	19.2	0.83	5.9	0.0	401	Stiff, Silty clay to clay *			20	1.61	1.66	09 - 13	10 - 15
8.5	10.0	11.5	0.81	5.4	0.0	363	Stiff, Silty clay to clay *			15	1.27	1.61	05 - 09	06 - 10
9.0	13.2	15.0	0.78	2.8	0.0	413	Stiff, Sandy clay to silty clay *			15	1.69	1.57	04 - 05	04 - 06
9.5	39.4	44.2	1.82	5.9	-0.0	283	Very stiff, Sandy clay to silty clay **			25	3.11	3.63	36 - 53	40 - 60
10.0	29.4	32.7	1.77	2.8	-0.0	497	Very stiff, Sandy silt to sandy clay			20	2.88	3.54	09 - 14	10 - 15
10.5	58.2	64.4	2.09	3.2	0.0	149	Hard, Sandy silt to sandy clay			25	4.61	4.17	27 - 36	30 - 40
11.0	15.0	16.5	0.86	3.0	-0.0	268	Stiff, Sandy clay to silty clay *			15	1.91	1.71	04 - 05	04 - 06
11.5	8.1	8.9	0.43	4.0	0.0	366	Firm, Silty clay to clay			15	0.99	0.86	02 - 04	02 - 04
12.0	8.0	8.7	0.28	1.6	-0.0	375	Stiff, Sandy silt to clayey silt			10	1.46	0.56	00 - 02	00 - 02
12.5	24.9	27.0	1.21	5.7	-0.0	279	Very stiff, Silty clay to clay *			20	2.41	2.42	18 - 28	20 - 30
13.0	13.4	14.5	1.13	2.5	0.1	294	Stiff, Clayey silt to silty clay			15	1.68	2.25	04 - 06	04 - 06
13.5	119.1	128.3	1.97	1.5	-0.0	191	Dense, Sand to silty sand	40-42	60-80				37 - 56	40 - 60
14.0	170.6	183.0	3.55	1.7	0.0	224	Dense, Sand to silty sand	40-42	60-80				37 - 56	40 - 60
14.5	217.9	232.8	3.69	1.7	-0.0	367	Very dense, Sand to silty sand	40-42	80-100				56 - 93	60 - 99
15.0	194.6	207.0	2.82	1.4	-0.0	383	Dense, Sand to silty sand	42-46	60-80				38 - 56	40 - 60
15.5	186.1	197.2	2.57	1.3	0.1	370	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
16.0	185.0	195.3	1.57	0.8	-0.0	345	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
16.5	183.0	192.4	0.30	0.2	0.0	448	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 38	30 - 40
17.0	190.8	199.9	1.12	0.3	0.1	369	Medium dense, Sand to silty sand	42-46	40-60				38 - 57	40 - 60
17.5	333.2	347.8	7.07	1.9	-0.0	648	Very dense, Sandy gravel to silty gravelly sand	40-42	+100				+ 96	+ 100
18.0	384.8	400.1	4.90	1.6	0.0	134	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 96	+ 100
18.5	141.0	146.1	5.12	2.2	0.0	792	Very dense, Silty sand to sandy silt	37-40	80-100				39 - 58	40 - 60
19.0	163.7	169.0	3.44	2.3	-0.0	445	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				58 - 96	60 - 99
19.5	117.1	120.5	3.65	2.5	-0.0	408	Very dense, Silty sand to sandy silt	37-40	80-100				39 - 58	40 - 60
20.0	85.3	87.5	5.31	5.3	-0.0	293	Hard, Sandy clay to silty clay **			30	5.61	10.62	+ 98	+ 100
20.5	106.5	108.9	5.31	5.5	-0.0	294	Hard, Sandy clay to silty clay **			33	6.38	10.62	+ 98	+ 100
21.0	78.8	80.2	6.31	4.9	0.0	347	Hard, Sandy clay to silty clay **			30	5.17	12.62	59 - 97	60 - 99
21.5	183.5	186.2	3.28	2.1	0.0	308	Very dense, Silty sand to sandy silt	40-42	80-100				59 - 98	60 - 99
22.0	162.7	164.6	5.90	3.5	0.0	377	Hard, Gravelly clayey sand to gravelly sandy silt			33	9.78	11.80	+ 99	+ 100
22.5	126.2	127.2	7.07	4.4	-0.0	378	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.56	14.14	+ 99	+ 100
23.0	192.0	193.0	8.57	3.5	0.0	238	Hard, Gravelly clayey sand to gravelly sandy silt			33	11.55	17.14	+ 99	+ 100
23.5	271.3	271.8	5.64	2.3	-0.0	314	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 100	+ 100
24.0	262.8	262.4	9.93	3.8	-0.0	444	Hard, Gravelly clayey sand to gravelly sandy silt			33	15.84	19.86	+ 100	+ 100
24.5	172.0	171.2	8.76	3.7	0.0	292	Hard, Gravelly clayey sand to gravelly sandy silt			33	10.33	17.53	+ 100	+ 100
25.0	207.3	205.8	13.02	6.0	-0.0	413	Hard, Hardpan to weak rock			33	12.48	26.04	+ 101	+ 100

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Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:14:16:52.07

SOUNDING NUMBER:CP-024

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	229.7	227.3	15.81	6.8	-0.0	472	Hard, Hardpan to weak rock			33	13.83	31.62	+ 101	+ 100
26.0	224.0	220.9	16.09	6.7	-0.0	445	Hard, Hardpan to weak rock			33	13.48	32.18	+ 101	+ 100
26.5	233.3	229.4	15.68	6.7	-0.0	428	Hard, Hardpan to weak rock			33	14.04	31.36	+ 102	+ 100
27.0	218.4	214.2	16.29	6.7	-0.0	386	Hard, Hardpan to weak rock			33	13.14	32.58	+ 102	+ 100
27.5	208.4	203.8	13.48	6.2	0.0	414	Hard, Hardpan to weak rock			33	12.53	26.96	+ 102	+ 100
28.0	224.4	218.8	15.93	6.9	0.0	381	Hard, Hardpan to weak rock			33	13.50	31.86	+ 103	+ 100

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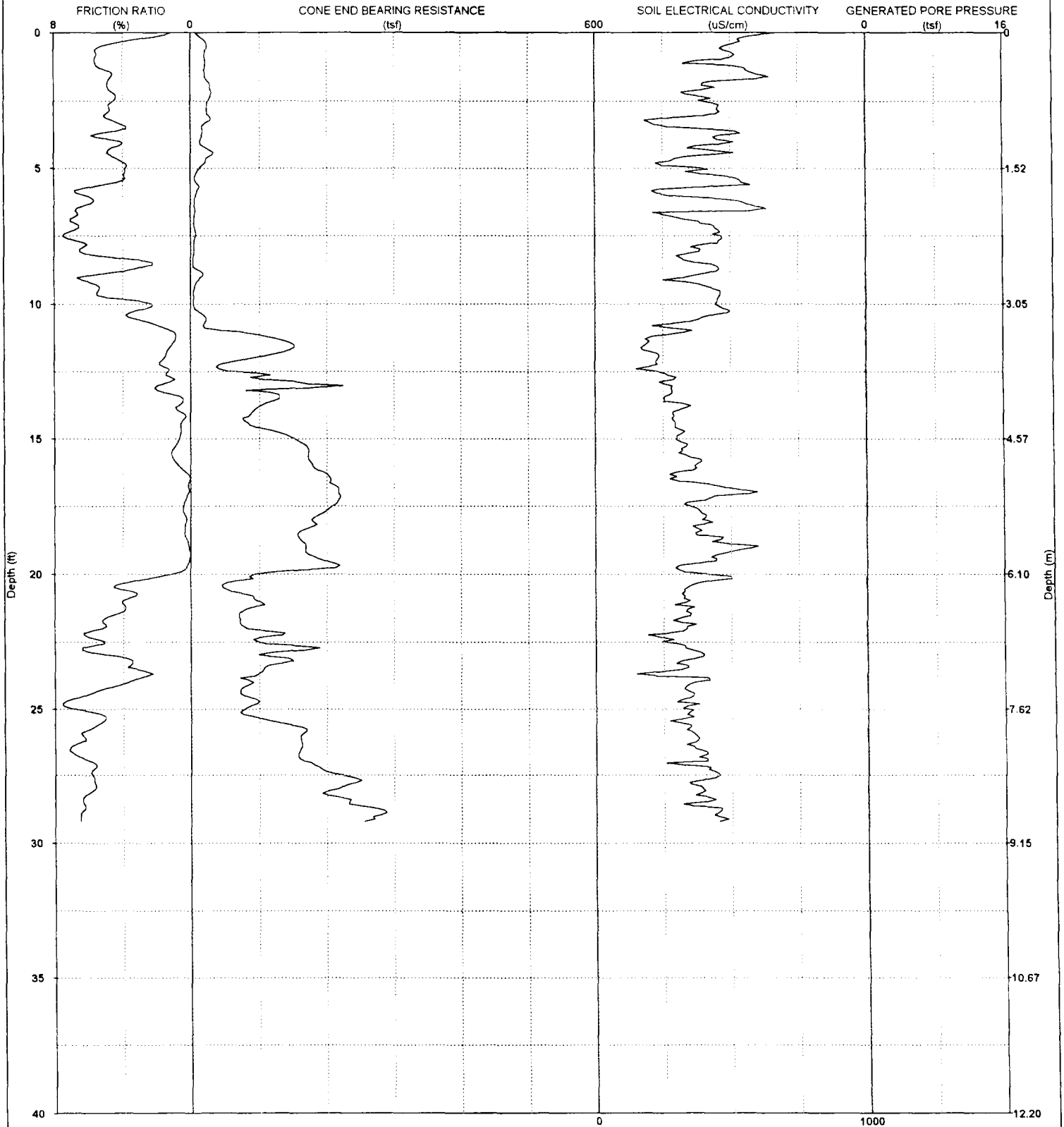
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:14:56:43.64

SOUNDING NUMBER:CP-025

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	23.1	37.2	1.17	5.7	-0.2	59	Stiff, Silty clay to clay *			25	1.84	2.35	19 - 25	30 - 40
1.5	20.6	31.3	1.08	4.6	-0.1	592	Stiff, Silty clay to clay *			25	1.64	2.16	10 - 13	15 - 20
2.0	27.3	39.9	1.36	4.9	-0.1	445	Very stiff, Silty clay to clay *			25	2.17	2.72	14 - 21	20 - 30
2.5	25.0	35.3	1.27	4.6	-0.1	396	Stiff, Silty clay to clay *			25	1.99	2.53	14 - 21	20 - 30
3.0	25.0	34.3	1.22	5.0	-0.1	428	Stiff, Silty clay to clay *			25	1.98	2.44	15 - 22	20 - 30
3.5	16.7	22.3	0.80	3.8	-0.1	361	Stiff, Silty clay to clay *			20	1.65	1.60	04 - 07	06 - 10
4.0	13.0	17.0	0.86	4.1	-0.1	513	Stiff, Silty clay to clay *			15	1.70	1.72	05 - 08	06 - 10
4.5	30.4	39.0	1.09	4.7	-0.1	405	Very stiff, Silty clay to clay *			25	2.41	2.18	16 - 23	20 - 30
5.0	12.2	15.4	0.80	3.8	-0.1	399	Stiff, Silty clay to clay *			15	1.59	1.59	03 - 05	04 - 06
5.5	7.0	8.7	0.39	4.2	-0.1	541	Stiff, Silty clay to clay *			10	1.34	0.77	02 - 03	02 - 04
6.0	7.0	8.6	0.56	6.2	-0.1	268	Stiff, Silty clay to clay *			12	1.11	1.12	03 - 05	04 - 06
6.5	6.1	7.3	0.38	6.7	-0.1	621	Firm, Silty clay to clay *			12	0.85	0.76	03 - 05	04 - 06
7.0	4.7	5.6	0.40	6.9	-0.1	388	Firm, Clay			12	0.72	0.80	03 - 05	04 - 06
7.5	6.6	7.8	0.44	7.5	-0.1	461	Stiff, Silty clay to clay *			12	1.03	0.88	03 - 05	04 - 06
8.0	4.6	5.3	0.34	6.5	-0.1	390	Firm, Clay			12	0.68	0.68	02 - 03	02 - 04
8.5	3.4	3.9	0.18	2.2	-0.1	385	Soft, Silty clay to clay			18	0.32	0.37	00 - 02	00 - 02
9.0	15.4	17.5	0.71	6.4	-0.1	346	Very stiff, Silty clay to clay *			14	2.12	1.42	09 - 13	10 - 15
9.5	4.1	4.6	0.44	5.4	-0.1	456	Firm, Clay			10	0.71	0.88	00 - 02	00 - 02
10.0	3.6	4.0	0.23	2.3	-0.1	448	Soft, Silty clay to clay			18	0.33	0.46	00 - 02	00 - 02
10.5	22.4	24.8	0.93	3.5	-0.1	396	Very stiff, Sandy clay to silty clay *			20	2.18	1.85	09 - 14	10 - 15
11.0	58.7	64.6	1.15	1.1	-0.1	345	Medium dense, Sand to silty sand	37-40	40-60				14 - 18	15 - 20
11.5	150.4	164.8	1.52	1.1	-0.1	188	Dense, Sand to silty sand	40-42	60-80				37 - 55	40 - 60
12.0	87.3	95.3	2.04	1.6	-0.1	233	Dense, Silty sand to sandy silt	37-40	60-80				16 - 28	20 - 30
12.5	64.3	69.9	1.46	1.3	-0.1	230	Medium dense, Silty sand to sandy silt	37-40	40-60				14 - 18	15 - 20
13.0	198.5	214.7	2.81	1.8	-0.1	272	Very dense, Silty sand to sandy silt	40-42	80-100				55 - 92	60 - 99
13.5	129.3	139.3	0.59	0.5	-0.1	255	Medium dense, Sand to silty sand	42-46	40-60				19 - 28	20 - 30
14.0	89.4	95.8	0.61	0.6	-0.1	286	Medium dense, Sand to silty sand	40-42	40-60				19 - 28	20 - 30
14.5	88.2	94.2	0.73	0.6	-0.1	295	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
15.0	152.0	161.7	1.13	0.7	-0.1	302	Medium dense, Sand to silty sand	42-46	40-60				28 - 38	30 - 40
15.5	173.5	183.8	2.05	1.1	-0.1	311	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
16.0	179.9	189.9	1.40	0.7	-0.1	368	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
16.5	206.6	217.3	0.10	0.1	-0.1	283	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 38	30 - 40
17.0	217.6	228.0	0.28	0.1	-0.1	584	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				38 - 57	40 - 60
17.5	208.9	218.0	0.96	0.4	-0.1	348	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
18.0	178.2	185.3	0.37	0.2	-0.1	398	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 38	30 - 40
18.5	157.6	163.3	0.64	0.4	-0.1	371	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
19.0	169.5	175.0	0.22	0.1	-0.1	589	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 39	30 - 40
19.5	194.4	200.0	0.20	0.1	-0.1	443	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				29 - 39	30 - 40
20.0	92.7	95.1	1.85	1.1	-0.1	411	Medium dense, Sand to silty sand	40-42	40-60				20 - 29	20 - 30
20.5	47.6	48.7	3.55	4.4	-0.1	336	Very stiff, Silty clay to clay *			25	3.71	7.11	29 - 39	30 - 40
21.0	99.6	101.4	3.64	4.0	-0.1	339	Hard, Gravelly sandy clay to gravelly silty clay **			30	6.55	7.29	59 - 97	60 - 99
21.5	69.4	70.4	3.87	4.6	-0.1	349	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.54	7.74	39 - 59	40 - 60
22.0	83.0	83.9	5.30	5.3	-0.1	337	Hard, Sandy clay to silty clay **			30	5.44	10.60	+ 99	+ 100
22.5	100.8	101.6	6.40	5.1	-0.1	261	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.02	12.80	+ 99	+ 100
23.0	107.2	107.7	6.22	4.7	-0.1	397	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.41	12.43	+ 99	+ 100
23.5	106.4	106.6	4.76	3.3	-0.1	322	Hard, Gravelly clayey sand to gravelly sandy silt			30	7.00	9.52	60 - 99	60 - 99
24.0	91.2	91.1	3.44	3.7	-0.1	364	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.98	6.88	40 - 60	40 - 60
24.5	79.8	79.5	5.60	6.3	-0.1	357	Hard, Sandy clay to silty clay **			30	5.22	11.21	+ 100	+ 100
25.0	77.6	77.0	6.39	6.8	-0.1	339	Hard, Sandy clay to silty clay **			30	5.07	12.77	+ 101	+ 100

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:14:56:43.64

SOUNDING NUMBER:CP-025

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	126.8	125.4	8.27	5.3	-0.1	303	Hard, Gravelly sandy clay to gravelly silty clay **			33	7.59	16.54	+ 101	+ 100
26.0	161.3	159.1	10.81	6.4	-0.1	372	Hard, Hardpan to weak rock			33	9.68	21.62	+ 101	+ 100
26.5	161.4	158.7	11.81	7.2	-0.1	374	Hard, Hardpan to weak rock			33	9.68	23.62	+ 102	+ 100
27.0	171.6	168.3	11.27	5.9	-0.2	332	Hard, Hardpan to weak rock			33	10.30	22.53	+ 102	+ 100
27.5	221.4	216.5	13.53	5.8	-0.1	452	Hard, Gravelly sandy clay to hardpan **			33	13.32	27.05	+ 102	+ 100
28.0	217.6	212.2	13.17	5.7	-0.1	393	Hard, Gravelly sandy clay to hardpan **			33	13.09	26.34	+ 103	+ 100
28.5	233.3	226.8	16.90	6.4	-0.1	386	Hard, Hardpan to weak rock			33	14.04	33.81	+ 103	+ 100
29.0	274.2	265.8	18.93	6.5	-0.1	444	Hard, Hardpan to weak rock			33	16.51	37.86	+ 103	+ 100

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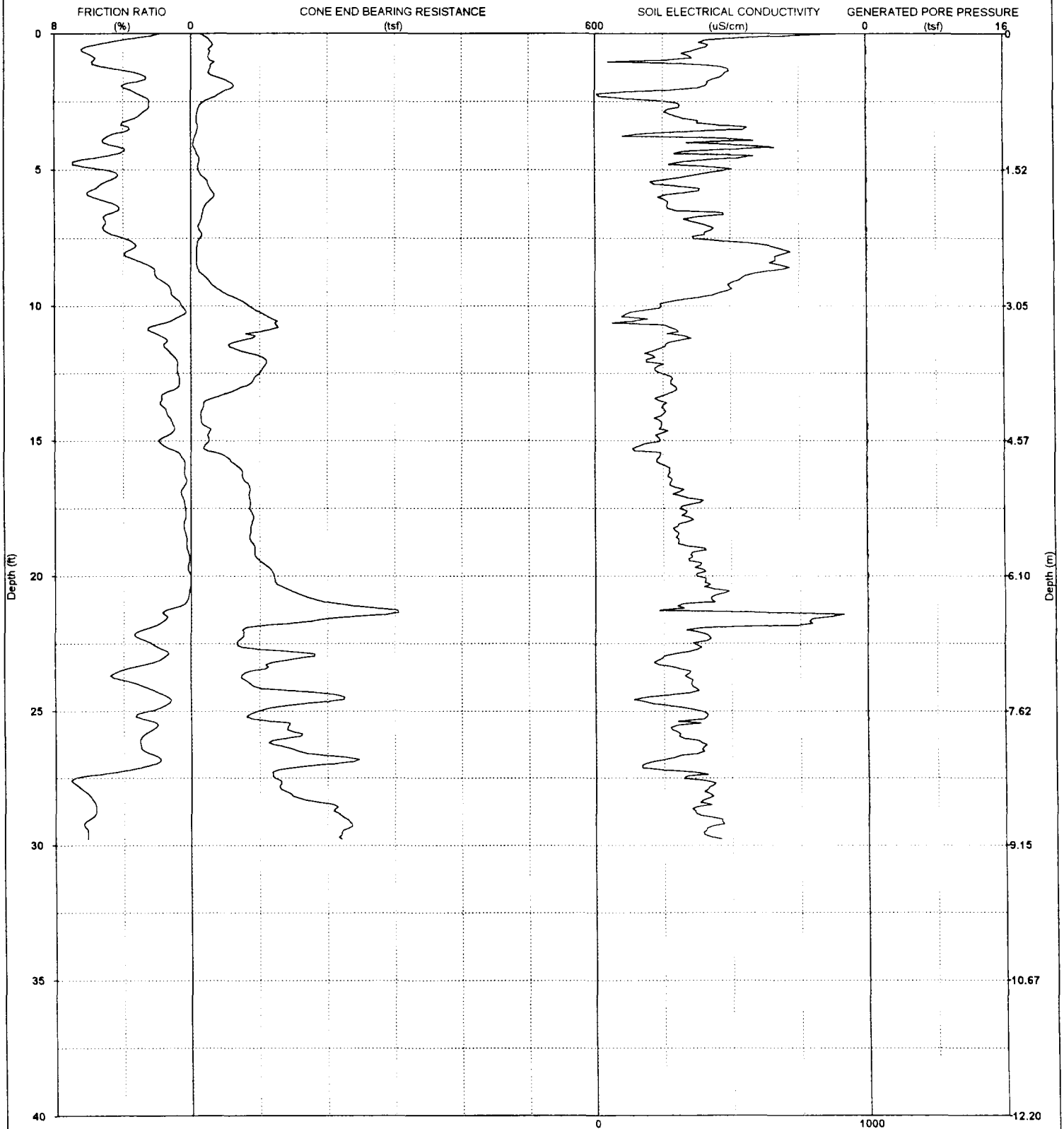
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:15:26:25.20

SOUNDING NUMBER:CP-026

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	29.8	48.0	1.67	6.5	-0.1	208	Very stiff, Sandy clay to silty clay **			25	2.38	3.33	25 - 37	40 - 60
1.5	27.5	41.9	1.42	3.0	-0.0	476	Very stiff, Sandy silt to sandy clay			25	2.19	2.85	10 - 13	15 - 20
2.0	59.3	86.7	1.99	4.0	-0.0	379	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	3.95	3.98	27 - 41	40 - 60
2.5	18.2	25.8	0.94	2.5	0.0	261	Stiff, Sandy silt to sandy clay			20	1.81	1.88	04 - 07	06 - 10
3.0	8.7	11.9	0.34	3.0	0.0	288	Stiff, Clayey silt to silty clay			15	1.13	0.69	01 - 03	02 - 04
3.5	9.5	12.7	0.28	3.6	0.0	554	Stiff, Silty clay to clay *			15	1.24	0.55	03 - 04	04 - 06
4.0	3.3	4.3	0.35	5.2	-0.0	340	Firm, Clay			10	0.61	0.70	00 - 02	00 - 02
4.5	10.9	14.0	0.54	5.0	-0.0	572	Stiff, Silty clay to clay *			15	1.42	1.08	05 - 08	06 - 10
5.0	11.0	13.9	0.87	5.1	-0.0	489	Stiff, Silty clay to clay *			15	1.43	1.73	05 - 08	06 - 10
5.5	24.5	30.3	1.54	5.2	0.0	214	Stiff, Silty clay to clay *			25	1.93	3.09	16 - 24	20 - 30
6.0	32.3	39.5	1.70	5.8	-0.0	234	Very stiff, Sandy clay to silty clay **			25	2.56	3.40	25 - 33	30 - 40
6.5	17.1	20.5	0.98	4.4	-0.0	339	Stiff, Silty clay to clay *			20	1.67	1.95	08 - 12	10 - 15
7.0	11.0	13.0	0.74	5.1	-0.0	403	Stiff, Silty clay to clay *			15	1.41	1.47	05 - 08	06 - 10
7.5	12.5	14.7	0.50	4.0	-0.0	363	Stiff, Silty clay to clay *			15	1.61	1.00	03 - 05	04 - 06
8.0	8.1	9.3	0.35	3.8	0.0	721	Stiff, Silty clay to clay			15	1.01	0.70	02 - 03	02 - 04
8.5	8.3	9.5	0.36	2.5	-0.0	692	Stiff, Clayey silt to silty clay			15	1.04	0.71	00 - 02	00 - 02
9.0	24.5	27.8	0.64	1.9	0.1	538	Medium dense, Silty sand to sandy silt	27-31	40-60				05 - 09	06 - 10
9.5	46.8	52.5	0.80	1.2	-0.0	465	Medium dense, Silty sand to sandy silt	36-37	40-60				09 - 13	10 - 15
10.0	85.4	94.9	0.62	0.6	-0.0	246	Medium dense, Sand to silty sand	40-42	40-60				14 - 18	15 - 20
10.5	120.5	133.2	1.29	1.0	-0.0	182	Medium dense, Sand to silty sand	40-42	40-60				27 - 36	30 - 40
11.0	90.2	99.3	2.54	2.2	0.0	287	Dense, Silty sand to sandy silt	37-40	60-80				27 - 36	30 - 40
11.5	55.8	61.1	1.39	1.6	-0.0	258	Medium dense, Silty sand to sandy silt	36-37	40-60				14 - 18	15 - 20
12.0	109.1	119.0	0.89	0.9	0.0	190	Medium dense, Sand to silty sand	40-42	40-60				18 - 28	20 - 30
12.5	99.4	108.0	0.83	0.8	-0.0	245	Medium dense, Sand to silty sand	40-42	40-60				18 - 28	20 - 30
13.0	76.3	82.5	0.68	0.8	-0.0	295	Medium dense, Sand to silty sand	40-42	40-60				14 - 18	15 - 20
13.5	22.8	24.6	0.87	1.8	-0.0	232	Loose, Silty sand to sandy silt	27-31	20-40				04 - 06	04 - 06
14.0	13.6	14.5	0.24	1.4	0.0	251	Stiff, Sandy silt to clayey silt			15	1.70	0.48	00 - 02	00 - 02
14.5	24.2	25.9	0.25	1.0	0.0	242	Loose, Silty sand to sandy silt	31-36	20-40				04 - 06	04 - 06
15.0	25.6	27.2	0.52	1.9	0.0	237	Medium dense, Silty sand to sandy silt	27-31	40-60				06 - 09	06 - 10
15.5	44.4	47.0	0.38	0.6	-0.0	241	Loose, Sand to silty sand	37-40	20-40				06 - 09	06 - 10
16.0	71.4	75.3	0.29	0.4	-0.0	277	Loose, Sand to silty sand	40-42	20-40				09 - 14	10 - 15
16.5	79.5	83.6	0.23	0.3	0.0	280	Loose, Sand to silty sand	40-42	20-40				10 - 14	10 - 15
17.0	84.7	88.8	0.47	0.6	-0.0	301	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
17.5	85.9	89.7	0.30	0.3	0.0	315	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
18.0	89.3	92.9	0.38	0.4	-0.0	338	Medium dense, Sand to silty sand	40-42	40-60				14 - 19	15 - 20
18.5	85.9	89.0	0.27	0.3	-0.0	303	Loose, Sand to silty sand	40-42	20-40				14 - 19	15 - 20
19.0	92.7	95.7	0.25	0.3	0.0	405	Medium dense, Sand to silty sand	40-42	40-60				15 - 19	15 - 20
19.5	103.7	106.7	0.17	0.2	-0.0	378	Medium dense, Sand to silty sand	40-42	40-60				15 - 19	15 - 20
20.0	121.9	125.0	0.02	0.1	0.1	371	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
20.5	142.6	145.7	0.21	0.1	-0.0	450	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
21.0	205.0	208.8	0.82	0.4	-0.0	381	Medium dense, Sand to silty sand	42-46	40-60				39 - 59	40 - 60
21.5	248.5	252.2	3.78	1.5	-0.0	879	Very dense, Sand to silty sand	42-46	80-100				59 - 98	60 - 99
22.0	74.7	75.6	4.22	2.9	-0.0	333	Hard, Sandy silt to sandy clay			25	5.87	8.44	30 - 40	30 - 40
22.5	66.7	67.3	2.70	2.3	-0.0	363	Dense, Silty sand to sandy silt	36-37	60-80				20 - 30	20 - 30
23.0	170.1	171.0	2.20	1.6	-0.0	249	Dense, Sand to silty sand	40-42	60-80				40 - 60	40 - 60
23.5	91.1	91.2	5.09	4.1	-0.0	339	Hard, Gravelly sandy clay to gravelly silty clay **			30	5.98	10.19	60 - 99	60 - 99
24.0	87.7	87.5	4.84	3.2	0.0	351	Hard, Sandy silt to sandy clay			30	5.75	9.68	40 - 60	40 - 60
24.5	225.5	224.5	2.15	1.3	-0.0	174	Dense, Sand to silty sand	42-46	60-80				60 - 99	60 - 99
25.0	98.0	97.3	3.88	2.5	-0.0	388	Very dense, Silty sand to sandy silt	36-37	80-100				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:15:26:25.20

SOUNDING NUMBER:CP-026

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	144.0	142.5	2.91	2.0	-0.0	321	Dense, Silty sand to sandy silt	37-40	60-80				40 - 61	40 - 60
26.0	139.1	137.2	4.52	3.0	-0.0	323	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				61 - 100	60 - 99
26.5	161.0	158.4	5.72	2.7	-0.0	392	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				61 - 101	60 - 99
27.0	194.7	190.9	4.81	2.3	-0.0	173	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				+ 102	+ 100
27.5	122.5	119.8	9.61	6.8	-0.0	324	Hard, Hardpan to weak rock			33	7.32	19.22	+ 102	+ 100
28.0	138.8	135.4	10.37	6.3	0.0	397	Hard, Hardpan to weak rock			33	8.31	20.74	+ 103	+ 100
28.5	210.9	205.1	12.15	5.7	0.0	409	Hard, Gravelly sandy clay to hardpan **			33	12.68	24.30	+ 103	+ 100
29.0	228.0	221.1	13.68	5.9	-0.0	451	Hard, Gravelly sandy clay to hardpan **			33	13.71	27.37	+ 103	+ 100
29.5	221.8	214.5	14.06	6.1	-0.0	396	Hard, Hardpan to weak rock			33	13.34	28.13	+ 103	+ 100

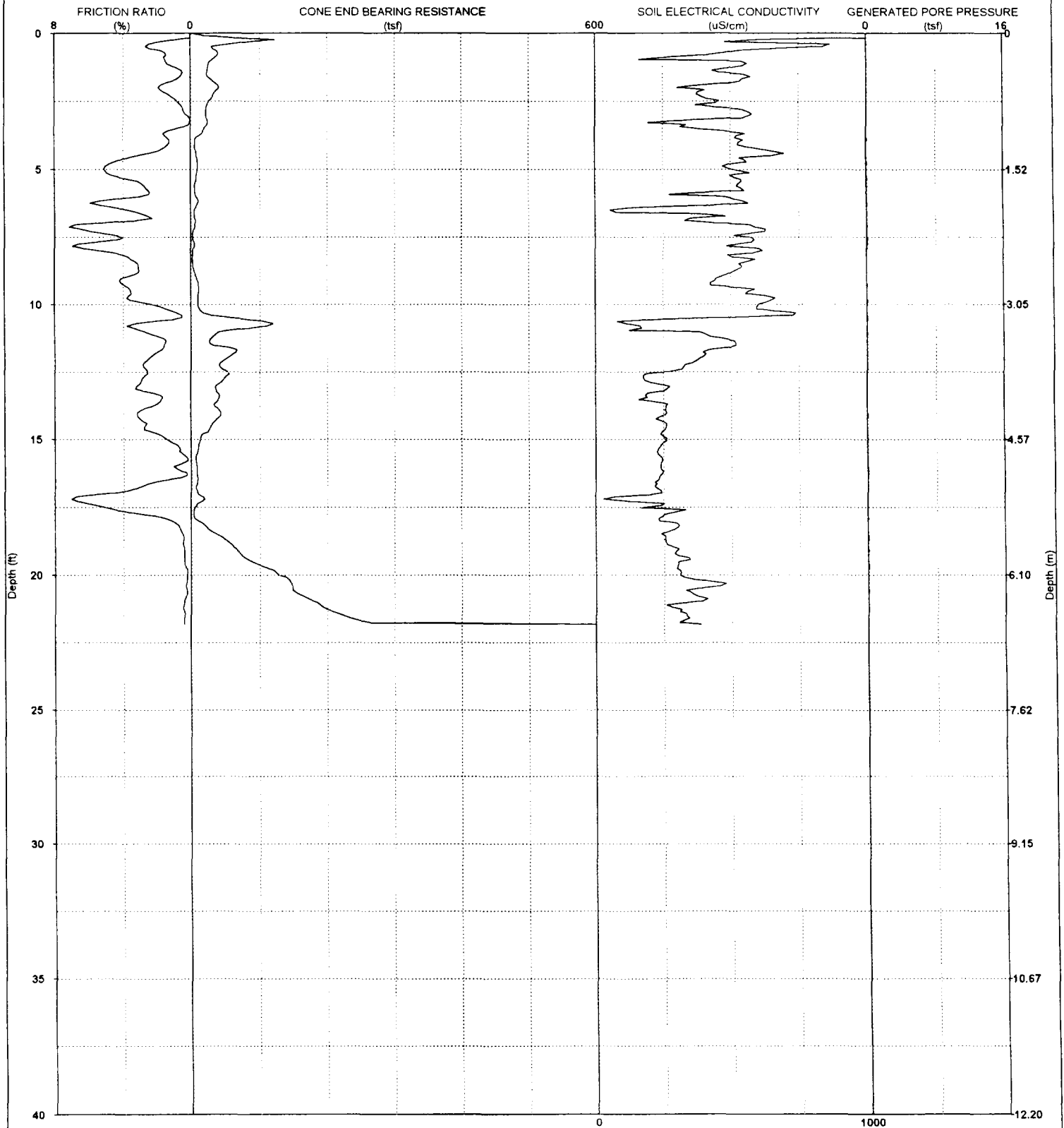
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:15:56:16.92

SOUNDING NUMBER:CP-027

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
1.0	25.9	41.8	0.65	1.8	0.1	590	Medium dense, Silty sand to sandy silt	27-31	40-60				06 - 09	10 - 15
1.5	22.8	34.8	0.16	0.5	-0.0	529	Loose, Sand to silty sand	36-37	20-40				03 - 04	04 - 06
2.0	41.5	60.5	0.70	1.9	-0.0	305	Medium dense, Silty sand to sandy silt	36-37	40-60				10 - 14	15 - 20
2.5	26.2	37.0	0.27	0.8	-0.0	456	Loose, Silty sand to sandy silt	36-37	20-40				03 - 04	04 - 06
3.0	21.9	30.0	0.06	0.3	-0.0	573	Loose, Sand to silty sand	36-37	20-40				03 - 04	04 - 06
3.5	19.8	26.6	0.15	0.8	-0.0	369	Loose, Silty sand to sandy silt	31-36	20-40				03 - 04	04 - 06
4.0	6.0	7.8	0.15	1.3	0.0	529	Stiff, Sandy silt to clayey silt			10	1.15	0.30	00 - 02	00 - 02
4.5	8.3	10.7	0.32	3.3	-0.0	623	Stiff, Silty clay to clay			15	1.07	0.65	02 - 03	02 - 04
5.0	9.7	12.2	0.49	5.1	-0.0	511	Stiff, Silty clay to clay *			15	1.25	0.98	05 - 08	06 - 10
5.5	8.1	7.5	0.24	3.0	-0.0	531	Stiff, Silty clay to clay			10	1.15	0.47	00 - 02	00 - 02
6.0	7.2	8.8	0.22	3.0	0.0	479	Stiff, Silty clay to clay			10	1.38	0.44	00 - 02	00 - 02
6.5	4.7	5.6	0.28	3.6	0.0	61	Firm, Silty clay to clay			10	0.85	0.56	00 - 02	00 - 02
7.0	5.6	6.7	0.34	6.0	0.0	505	Firm, Clay			12	0.87	0.69	03 - 05	04 - 06
7.5	2.0	2.4	0.14	4.1	0.1	563	Very soft, Clay			18	0.17	0.28	00 - 02	00 - 02
8.0	2.6	3.0	0.19	5.4	0.0	619	Soft, Clay			10	0.43	0.38	00 - 02	00 - 02
8.5	2.5	2.8	0.14	3.1	0.0	533	Very soft, Silty clay to clay			18	0.22	0.28	00 - 02	00 - 02
9.0	7.6	8.6	0.41	3.9	-0.0	456	Stiff, Silty clay to clay			10	1.41	0.81	02 - 04	02 - 04
9.5	11.2	12.6	0.37	3.6	0.0	589	Stiff, Silty clay to clay *			15	1.42	0.74	04 - 05	04 - 06
10.0	10.3	11.4	0.45	2.3	0.0	602	Stiff, Clayey silt to silty clay			15	1.29	0.90	00 - 02	00 - 02
10.5	62.8	69.4	0.41	0.7	0.1	424	Medium dense, Sand to silty sand	40-42	40-60				09 - 14	10 - 15
11.0	45.9	50.6	2.46	2.8	-0.0	257	Very stiff, Sandy silt to sandy clay			25	3.62	4.92	18 - 27	20 - 30
11.5	30.4	33.3	0.88	1.6	-0.0	518	Medium dense, Silty sand to sandy silt	27-31	40-60				05 - 09	06 - 10
12.0	51.2	55.9	1.40	2.5	-0.0	384	Hard, Sandy silt to sandy clay			25	4.04	2.80	18 - 28	20 - 30
12.5	53.9	58.6	1.21	2.5	-0.0	255	Hard, Sandy silt to sandy clay			25	4.26	2.41	18 - 28	20 - 30
13.0	36.7	39.7	1.48	3.2	-0.0	259	Very stiff, Sandy clay to silty clay *			25	2.88	2.95	14 - 18	15 - 20
13.5	39.8	42.8	0.68	1.8	0.0	168	Medium dense, Silty sand to sandy silt	27-31	40-60				09 - 14	10 - 15
14.0	43.4	46.6	1.25	3.2	0.0	263	Very stiff, Sandy silt to sandy clay			25	3.41	2.50	19 - 28	20 - 30
14.5	28.9	30.9	0.92	2.7	-0.0	262	Very stiff, Sandy silt to sandy clay			20	2.80	1.84	09 - 14	10 - 15
15.0	13.3	14.1	0.30	1.4	-0.0	264	Stiff, Sandy silt to clayey silt			15	1.65	0.59	00 - 02	00 - 02
15.5	8.6	9.1	0.06	0.6	-0.0	228	Very loose, Silty sand to sandy silt	27-31	0-20				00 - 02	00 - 02
16.0	8.1	8.6	0.09	1.0	0.0	241	Stiff, Sandy silt to clayey silt			10	1.43	0.18	00 - 02	00 - 02
16.5	9.2	9.7	0.14	1.5	-0.0	228	Stiff, Sandy silt to clayey silt			10	1.64	0.28	00 - 02	00 - 02
17.0	10.6	11.1	0.63	5.1	-0.0	222	Stiff, Silty clay to clay *			15	1.28	1.27	04 - 06	04 - 06
17.5	6.2	6.5	0.65	5.2	-0.0	188	Stiff, Clay			10	1.04	1.31	02 - 04	02 - 04
18.0	10.5	10.9	0.26	1.2	0.0	235	Stiff, Sandy silt to clayey silt			15	1.26	0.52	00 - 02	00 - 02
18.5	37.7	39.1	0.25	0.5	0.0	245	Loose, Sand to silty sand	37-40	20-40				04 - 06	04 - 06
19.0	63.8	65.8	0.31	0.4	0.0	296	Loose, Sand to silty sand	40-42	20-40				10 - 15	10 - 15
19.5	87.9	90.4	0.42	0.4	-0.0	314	Medium dense, Sand to silty sand	40-42	40-60				15 - 19	15 - 20
20.0	128.5	131.7	0.34	0.2	-0.0	311	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
20.5	148.8	152.0	0.49	0.3	0.0	374	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
21.0	182.4	185.7	0.88	0.4	-0.0	361	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.5	223.4	226.7	1.18	0.4	-0.0	334	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				39 - 59	40 - 60

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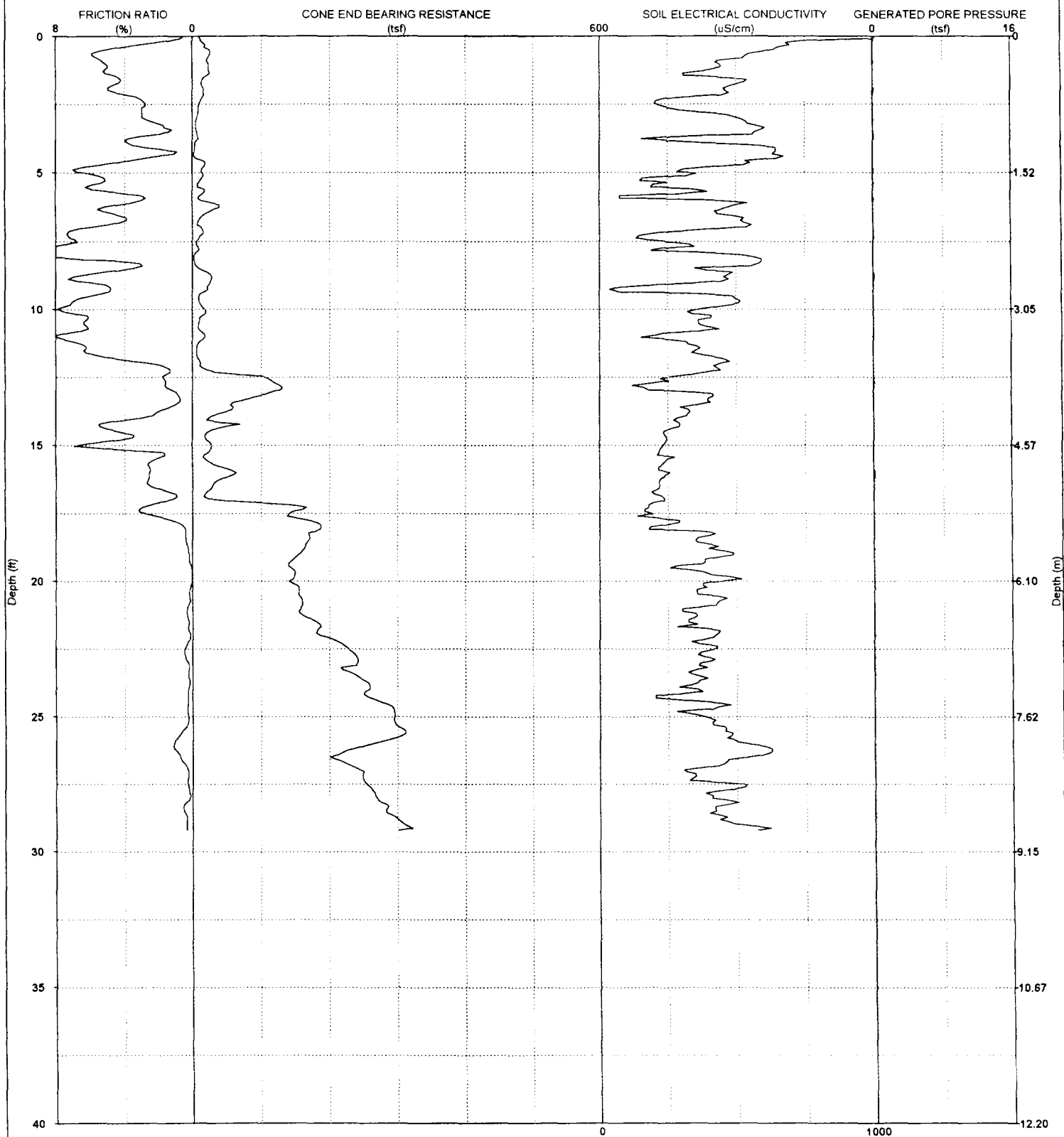
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:16:35:18.07

SOUNDING NUMBER:CP-028

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (NT)
1.0	24.6	39.6	1.10	4.8	-0.0	483	Stiff, Silty clay to clay *			25	1.96	2.20	12 - 19	20 - 30
1.5	17.4	26.5	0.97	4.4	0.0	412	Stiff, Silty clay to clay *			20	1.73	1.94	10 - 13	15 - 20
2.0	15.8	23.1	0.71	4.9	0.1	463	Stiff, Silty clay to clay *			20	1.57	1.42	07 - 10	10 - 15
2.5	9.5	13.4	0.37	2.8	-0.0	209	Stiff, Clayey silt to silty clay			15	1.25	0.74	03 - 04	04 - 06
3.0	6.1	8.4	0.24	2.9	0.0	506	Stiff, Silty clay to clay			10	1.19	0.48	00 - 01	00 - 02
3.5	5.7	7.6	0.04	1.4	0.0	574	Stiff, Sandy silt to clayey silt			10	1.09	0.07	00 - 01	00 - 02
4.0	3.4	4.5	0.20	3.5	0.0	566	Soft, Silty clay to clay			18	0.36	0.40	00 - 02	00 - 02
4.5	7.7	9.9	0.46	3.1	-0.0	618	Firm, Silty clay to clay			15	1.00	0.93	02 - 03	02 - 04
5.0	13.4	17.0	0.92	6.4	-0.0	321	Stiff, Silty clay to clay *			14	1.88	1.84	08 - 12	10 - 15
5.5	7.2	8.9	0.78	6.2	-0.0	190	Firm, Silty clay to clay *			14	0.98	1.57	03 - 05	04 - 06
6.0	12.1	14.8	0.83	3.0	0.0	420	Stiff, Sandy clay to silty clay *			15	1.57	1.66	03 - 05	04 - 06
6.5	17.1	20.6	1.25	4.6	-0.0	451	Stiff, Silty clay to clay *			20	1.67	2.50	08 - 12	10 - 15
7.0	12.6	15.0	0.72	6.3	0.0	483	Stiff, Silty clay to clay *			14	1.74	1.43	08 - 13	10 - 15
7.5	6.2	7.3	0.72	6.8	-0.0	228	Firm, Silty clay to clay *			12	0.97	1.43	03 - 05	04 - 06
8.0	1.9	2.2	0.59	9.6	-0.0	523	Soft, Organics to peat			10	0.29	1.18	00 - 02	00 - 02
8.5	9.7	11.2	0.79	3.7	-0.0	360	Stiff, Silty clay to clay *			15	1.23	1.58	03 - 05	04 - 06
9.0	24.9	28.2	1.40	6.3	-0.0	399	Stiff, Silty clay to clay *			25	1.95	2.80	18 - 26	20 - 30
9.5	9.3	10.4	1.07	5.9	0.0	460	Stiff, Silty clay to clay *			15	1.16	2.14	05 - 09	06 - 10
10.0	17.3	19.2	1.11	7.9	-0.0	365	Stiff, Silty clay to clay *			18	1.86	2.22	18 - 27	20 - 30
10.5	8.7	9.7	0.86	6.4	-0.0	364	Stiff, Silty clay to clay *			14	1.16	1.71	05 - 09	06 - 10
11.0	17.7	19.4	0.99	8.0	-0.0	178	Stiff, Silty clay to clay *			18	1.89	1.98	18 - 27	20 - 30
11.5	5.8	6.3	0.63	6.3	-0.0	358	Firm, Clay			12	0.85	1.28	04 - 05	04 - 06
12.0	12.3	13.4	0.80	2.4	-0.0	439	Stiff, Clayey silt to silty clay			15	1.54	1.60	02 - 04	02 - 04
12.5	105.5	114.8	2.22	1.7	-0.0	251	Dense, Silty sand to sandy silt	37-40	60-80				28 - 37	30 - 40
13.0	122.1	132.0	1.27	1.1	-0.0	250	Dense, Sand to silty sand	40-42	60-80				28 - 37	30 - 40
13.5	56.1	60.4	0.84	1.0	-0.0	372	Medium dense, Sand to silty sand	37-40	40-60				09 - 14	10 - 15
14.0	23.7	25.4	1.15	3.0	0.0	285	Very stiff, Sandy clay to silty clay *			20	2.29	2.30	06 - 09	06 - 10
14.5	23.6	25.2	1.62	4.4	-0.0	236	Very stiff, Silty clay to clay *			20	2.27	3.24	09 - 14	10 - 15
15.0	27.5	29.3	1.56	6.7	-0.0	234	Very stiff, Silty clay to clay *			21	2.54	3.12	19 - 28	20 - 30
15.5	17.4	18.4	0.79	2.1	0.0	255	Very stiff, Sandy silt to clayey silt			15	2.19	1.58	04 - 06	04 - 06
16.0	63.7	67.2	1.11	2.5	0.0	258	Dense, Silty sand to sandy silt	27-31	60-80				19 - 28	20 - 30
16.5	28.3	29.7	1.04	2.4	-0.0	220	Very stiff, Sandy silt to sandy clay			20	2.73	2.08	06 - 10	06 - 10
17.0	35.0	36.6	1.54	1.3	-0.0	239	Loose, Silty sand to sandy silt	36-37	20-40				06 - 10	06 - 10
17.5	141.9	148.1	4.74	2.8	-0.0	190	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				57 - 95	60 - 99
18.0	188.1	195.6	0.76	0.5	-0.0	186	Medium dense, Sand to silty sand	42-46	40-60				38 - 58	40 - 60
18.5	170.1	176.2	0.67	0.4	0.0	353	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
19.0	156.4	161.5	0.38	0.2	-0.0	489	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
19.5	142.9	147.0	0.09	0.1	-0.0	264	Medium dense, Sand to silty sand	42-46	40-60				19 - 29	20 - 30
20.0	140.5	144.1	0.11	0.1	-0.0	449	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
20.5	155.7	159.1	0.33	0.2	-0.0	379	Medium dense, Sand to silty sand	42-46	40-60				20 - 29	20 - 30
21.0	158.8	161.7	0.51	0.3	-0.0	334	Medium dense, Sand to silty sand	42-46	40-60				29 - 39	30 - 40
21.5	180.6	183.3	0.42	0.2	-0.0	324	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 39	30 - 40
22.0	186.5	188.7	0.26	0.1	0.0	422	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				30 - 40	30 - 40
22.5	228.4	230.3	1.06	0.4	0.0	420	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60
23.0	241.4	242.6	0.64	0.3	-0.0	386	Dense, Sandy gravel to gravelly sand	42-46	60-80				40 - 60	40 - 60
23.5	239.0	239.5	0.71	0.3	0.0	358	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
24.0	258.5	258.2	0.71	0.3	-0.0	360	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
24.5	280.7	279.5	0.78	0.3	0.0	439	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60
25.0	295.8	293.6	0.77	0.3	-0.0	383	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 60	40 - 60

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-22-2002 TIME:16:35:18.07

SOUNDING NUMBER:CP-028

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	311.0	307.7	1.78	0.6	-0.0	457	Dense, Sandy gravel to gravelly sand	+46	60-80				40 - 61	40 - 60
26.0	262.2	258.7	3.29	1.1	0.0	548	Dense, Sand to silty sand	42-46	60-80				61 - 100	60 - 99
26.5	203.6	200.3	1.71	0.7	-0.0	519	Dense, Sand to silty sand	42-46	60-80				41 - 61	40 - 60
27.0	247.1	242.3	0.74	0.3	-0.0	311	Dense, Sandy gravel to gravelly sand	42-46	60-80				41 - 61	40 - 60
27.5	254.7	249.1	0.84	0.3	-0.0	507	Dense, Sandy gravel to gravelly sand	42-46	60-80				41 - 61	40 - 60
28.0	269.9	263.2	0.31	0.2	0.0	409	Medium dense, Sandy gravel to gravelly sand	+46	40-60				41 - 62	40 - 60
28.5	283.5	275.6	1.55	0.5	0.0	419	Dense, Sandy gravel to gravelly sand	42-46	60-80				41 - 62	40 - 60
29.0	311.6	302.1	2.09	0.4	-0.0	519	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60

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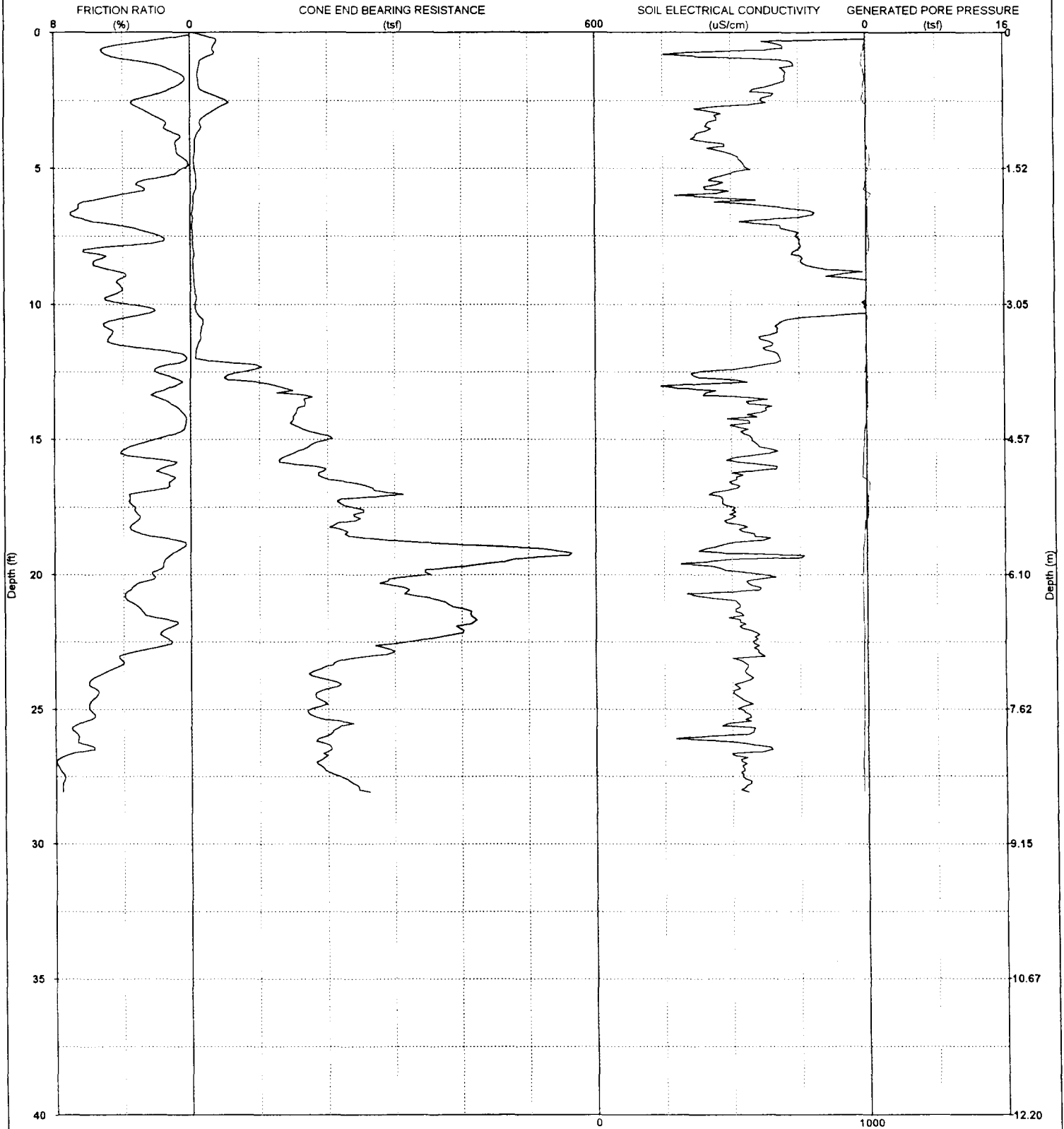
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:08:29:57.01

SOUNDING NUMBER:CP-029

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	13.7	22.1	0.84	3.4	-0.7	732	Stiff, Sandy clay to silty clay *			20	1.37	1.69	04 - 06	06 - 10
1.5	10.2	15.5	0.07	0.7	-0.3	703	Very loose, Silty sand to sandy silt	31-36	0-20				00 - 01	00 - 02
2.0	12.1	17.7	0.25	0.9	-0.4	629	Loose, Silty sand to sandy silt	31-36	20-40				00 - 01	00 - 02
2.5	52.7	74.4	1.43	3.4	-0.5	615	Very stiff, Sandy silt to sandy clay			30	3.50	2.86	28 - 42	40 - 60
3.0	24.4	33.5	0.92	2.3	-0.0	452	Very stiff, Sandy silt to sandy clay			20	2.42	1.84	07 - 11	10 - 15
3.5	15.2	20.4	0.26	1.5	-0.0	425	Loose, Silty sand to sandy silt	27-31	20-40				03 - 04	04 - 06
4.0	6.3	8.2	0.09	0.9	-0.0	412	Stiff, Sandy silt to clayey silt			10	1.21	0.18	00 - 02	00 - 02
4.5	5.2	6.7	0.05	0.7	0.3	514	Firm, Sandy silt to clayey silt			10	0.99	0.09	00 - 02	00 - 02
5.0	5.6	7.0	0.04	0.4	0.2	566	Stiff, Sandy silt to clayey silt			10	1.05	0.07	00 - 02	00 - 02
5.5	7.8	9.7	0.22	3.0	-0.2	460	Stiff, Silty clay to clay			15	1.00	0.44	00 - 02	00 - 02
6.0	4.2	5.1	0.29	4.3	0.4	294	Soft, Clay			18	0.42	0.58	00 - 02	00 - 02
6.5	3.1	3.7	0.23	6.6	0.1	738	Firm, Clay to organic soil			10	0.53	0.46	00 - 02	00 - 02
7.0	2.5	2.9	0.15	5.3	0.1	560	Soft, Clay			10	0.41	0.29	00 - 02	00 - 02
7.5	2.7	3.2	0.05	1.8	0.2	742	Soft, Sensitive fine grained soil			18	0.25	0.11	00 - 02	00 - 02
8.0	3.7	4.3	0.29	6.3	0.2	745	Firm, Clay			10	0.64	0.58	00 - 02	00 - 02
8.5	3.3	3.8	0.22	5.8	-0.1	767	Firm, Clay			10	0.55	0.45	00 - 02	00 - 02
9.0	4.0	4.6	0.18	3.9	-0.1	894	Soft, Silty clay to clay			18	0.39	0.36	00 - 02	00 - 02
9.5	5.6	6.2	0.28	4.1	-0.1	1119	Firm, Silty clay to clay			10	1.00	0.57	00 - 02	00 - 02
10.0	6.8	7.6	0.32	3.6	-0.1	998	Stiff, Silty clay to clay			10	1.25	0.64	00 - 02	00 - 02
10.5	15.3	16.9	0.64	3.9	0.1	739	Stiff, Silty clay to clay *			15	1.96	1.29	05 - 09	06 - 10
11.0	14.6	16.1	0.73	4.6	-0.1	670	Stiff, Silty clay to clay *			15	1.87	1.46	05 - 09	06 - 10
11.5	10.2	11.1	0.56	4.3	-0.1	653	Stiff, Silty clay to clay *			15	1.26	1.13	04 - 05	04 - 06
12.0	6.4	7.0	0.09	0.2	-0.1	682	, Sensitive fine grained soil	27-31	DEFINED				00 - 02	00 - 02
12.5	75.8	82.3	1.53	2.1	-0.2	379	Dense, Silty sand to sandy silt	37-40	60-80				18 - 28	20 - 30
13.0	121.2	131.0	1.31	0.8	0.1	306	Medium dense, Sand to silty sand	40-42	40-60				28 - 37	30 - 40
13.5	169.4	182.4	2.65	1.8	0.0	611	Very dense, Silty sand to sandy silt	40-42	80-100				56 - 92	60 - 99
14.0	155.5	166.8	0.80	0.5	-0.1	612	Medium dense, Sand to silty sand	42-46	40-60				28 - 37	30 - 40
14.5	154.1	164.6	0.59	0.3	-0.2	505	Medium dense, Sand to silty sand	42-46	40-60				28 - 37	30 - 40
15.0	202.5	215.5	3.83	2.1	-0.4	575	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+ 94	+ 100
15.5	150.8	159.8	7.19	4.1	-0.5	648	Hard, Gravelly clayey sand to gravelly sandy silt			33	9.08	14.38	+ 94	+ 100
16.0	186.3	196.7	2.75	1.4	-0.5	670	Dense, Sand to silty sand	40-42	60-80				38 - 57	40 - 60
16.5	209.3	220.1	2.97	1.1	0.1	513	Dense, Sand to silty sand	42-46	60-80				38 - 57	40 - 60
17.0	301.6	315.9	9.43	3.3	0.1	425	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 95	+ 100
17.5	236.2	246.6	8.07	3.3	0.1	506	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 96	+ 100
18.0	242.2	251.9	7.74	3.1	-0.3	474	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 96	+ 100
18.5	227.6	235.8	9.20	2.8	-0.4	586	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 97	+ 100
19.0	495.8	511.9	2.41	0.5	-0.5	420	Very dense, Sandy gravel to gravelly sand	+46	80-100				+ 97	+ 100
19.5	469.3	482.9	8.02	1.6	-0.5	432	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 97	+ 100
20.0	354.0	363.0	9.60	2.3	-0.6	619	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	+100				+ 98	+ 100
20.5	316.8	323.7	11.23	3.5	-0.6	607	Very dense, Gravelly silty sand to clayey gravelly sand	27-31	+100				+ 98	+ 100
21.0	373.0	379.8	14.52	3.6	-0.6	516	Hard, Gravelly clayey sand to gravelly sandy clay			33	22.53	29.04	+ 98	+ 100
21.5	414.0	420.2	11.38	2.7	-0.5	541	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	+100				+ 99	+ 100
22.0	397.5	402.1	5.88	1.4	-0.5	538	Very dense, Sandy gravel to silty gravelly sand	42-46	80-100				+ 99	+ 100
22.5	320.9	323.5	3.90	1.1	-0.5	579	Very dense, Sand to silty sand	42-46	80-100				60 - 98	60 - 99
23.0	275.5	276.9	12.12	4.1	-0.5	616	Hard, Gravelly clayey sand to gravelly sandy clay			33	16.61	24.24	+ 99	+ 100
23.5	190.3	190.7	10.05	4.6	-0.5	553	Hard, Gravelly sandy clay to hardpan **			33	11.45	20.10	+ 100	+ 100
24.0	213.9	213.6	12.10	6.0	-0.6	540	Hard, Hardpan to weak rock			33	12.88	24.20	+ 100	+ 100
24.5	181.9	181.1	11.13	5.6	-0.6	519	Hard, Gravelly sandy clay to hardpan **			33	10.93	22.27	+ 100	+ 100
25.0	173.0	171.7	11.48	6.0	-0.6	530	Hard, Hardpan to weak rock			33	10.39	22.95	+ 101	+ 100

\* Indicates lightly overconsolidated soil

\*\* Indicates heavily overconsolidated or cemented soil

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Both undrained and drained parameters can be estimated for these soils.

Structure rate of loading should be considered in choosing which strength parameters to use for design.

Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:08:29:57.01

SOUNDING NUMBER:CP-029

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	233.3	230.8	13.97	6.5	-0.6	504	Hard, Hardpan to weak rock			33	14.05	27.93	+ 101	+ 100
26.0	196.2	193.6	14.09	6.7	-0.6	392	Hard, Hardpan to weak rock			33	11.80	28.18	+ 101	+ 100
26.5	203.9	200.6	11.63	5.9	-0.6	640	Hard, Gravelly sandy clay to hardpan **			33	12.26	23.26	+ 102	+ 100
27.0	183.5	180.0	15.87	8.0	-0.6	544	Hard, Hardpan to weak rock			24	15.16	31.74	+ 102	+ 100
27.5	216.7	211.9	17.54	7.5	-0.6	538	Hard, Hardpan to weak rock			33	13.03	35.07	+ 102	+ 100
28.0	246.1	239.9	17.47	7.6	-0.6	530	Hard, Hardpan to weak rock			33	14.81	34.94	+ 103	+ 100

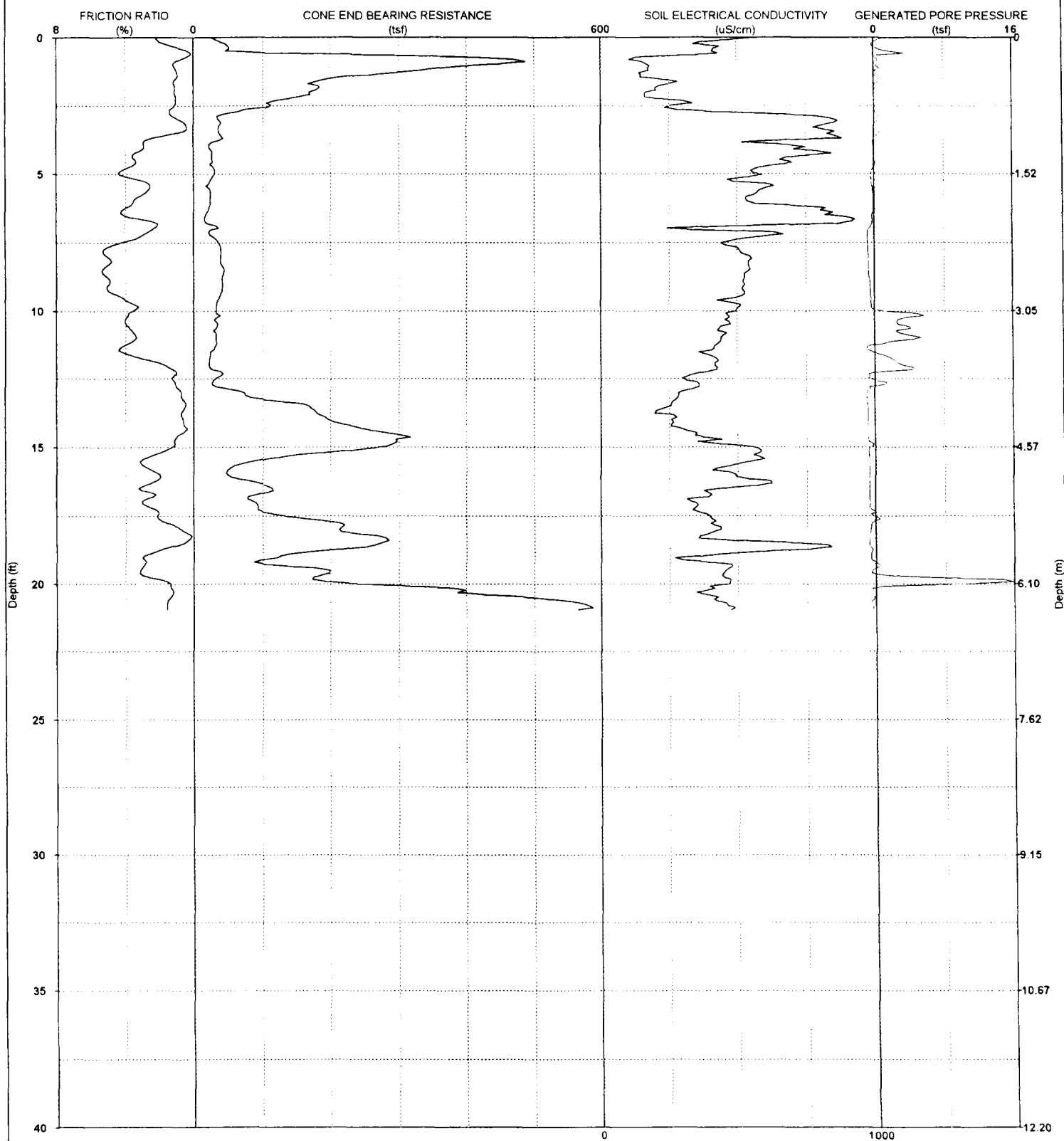
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:10:31:42.16

SOUNDING NUMBER:CP-030

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	406.7	655.1	4.07	1.2	1.5	165	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 62	+ 100
1.5	200.2	304.8	3.08	1.0	0.5	203	Dense, Sand to silty sand	42-46	60-80				39 - 65	60 - 99
2.0	169.0	246.8	2.01	1.1	-0.0	162	Dense, Sand to silty sand	42-46	60-80				41 - 68	60 - 99
2.5	110.9	156.6	1.33	1.1	0.0	252	Dense, Sand to silty sand	40-42	60-80				28 - 42	40 - 60
3.0	35.3	48.4	0.56	0.9	0.4	856	Loose, Silty sand to sandy silt	37-40	20-40				04 - 07	06 - 10
3.5	36.9	49.4	0.30	1.0	0.5	836	Loose, Silty sand to sandy silt	37-40	20-40				04 - 07	06 - 10
4.0	21.7	28.4	0.91	2.9	-0.2	748	Very stiff, Sandy clay to silty clay *			20	2.14	1.82	08 - 11	10 - 15
4.5	27.0	34.6	0.95	3.4	0.0	667	Very stiff, Sandy clay to silty clay *			25	2.13	1.89	12 - 16	15 - 20
5.0	29.2	36.9	1.24	4.4	-0.5	577	Very stiff, Silty clay to clay *			25	2.31	2.48	16 - 24	20 - 30
5.5	21.0	26.1	0.61	2.6	-0.3	612	Very stiff, Sandy silt to sandy clay			20	2.07	1.22	05 - 08	06 - 10
6.0	23.5	28.7	0.84	3.5	-0.2	539	Very stiff, Sandy clay to silty clay *			20	2.31	1.68	08 - 12	10 - 15
6.5	17.3	20.8	0.91	4.0	-0.3	842	Stiff, Silty clay to clay *			20	1.69	1.82	05 - 08	06 - 10
7.0	29.8	35.4	0.66	2.4	-0.7	287	Very stiff, Sandy silt to sandy clay			20	2.94	1.32	08 - 13	10 - 15
7.5	35.7	41.9	1.65	4.3	-0.8	451	Very stiff, Silty clay to clay *			25	2.82	3.30	17 - 26	20 - 30
8.0	38.7	44.9	2.04	5.1	-0.8	548	Very stiff, Sandy clay to silty clay **			25	3.06	4.08	26 - 35	30 - 40
8.5	43.6	50.0	2.25	5.3	-0.7	546	Very stiff, Sandy clay to silty clay **			25	3.45	4.49	35 - 52	40 - 60
9.0	41.4	46.9	2.05	5.0	-0.6	526	Very stiff, Sandy clay to silty clay **			25	3.27	4.11	26 - 35	30 - 40
9.5	36.2	40.6	1.66	4.2	-0.5	499	Very stiff, Silty clay to clay *			25	2.85	3.33	18 - 27	20 - 30
10.0	32.9	36.5	1.26	3.8	1.1	498	Very stiff, Sandy clay to silty clay *			25	2.58	2.52	14 - 18	15 - 20
10.5	34.2	37.8	1.29	3.9	2.9	467	Very stiff, Sandy clay to silty clay *			25	2.68	2.59	18 - 27	20 - 30
11.0	32.2	35.4	1.07	3.4	4.9	443	Very stiff, Sandy clay to silty clay *			25	2.52	2.13	14 - 18	15 - 20
11.5	24.3	26.6	1.31	4.3	-0.4	372	Very stiff, Silty clay to clay *			20	2.38	2.63	14 - 18	15 - 20
12.0	22.1	24.1	0.54	1.7	3.2	418	Loose, Silty sand to sandy silt	27-31	20-40				04 - 06	04 - 06
12.5	30.8	33.5	0.52	1.3	-0.6	303	Loose, Silty sand to sandy silt	36-37	20-40				06 - 09	06 - 10
13.0	70.3	76.0	0.77	0.8	-0.9	292	Medium dense, Sand to silty sand	40-42	40-60				14 - 18	15 - 20
13.5	167.3	180.2	0.87	0.5	-0.8	256	Medium dense, Sand to silty sand	42-46	40-60				28 - 37	30 - 40
14.0	197.3	211.6	1.38	0.6	-0.9	258	Dense, Sand to silty sand	42-46	60-80				37 - 56	40 - 60
14.5	289.3	309.0	2.79	0.7	-0.9	351	Dense, Sand to silty sand	42-46	60-80				56 - 93	60 - 99
15.0	272.4	289.8	3.63	1.3	-0.6	552	Very dense, Sand to silty sand	42-46	80-100				56 - 93	60 - 99
15.5	89.8	95.2	5.46	3.1	-0.7	562	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.92	10.92	38 - 57	40 - 60
16.0	47.7	50.3	1.55	2.0	-0.7	494	Medium dense, Silty sand to sandy silt	27-31	40-60				14 - 19	15 - 20
16.5	114.2	120.1	3.21	3.2	-0.7	442	Hard, Gravelly clayey sand to gravelly sandy silt			30	7.55	6.42	57 - 94	60 - 99
17.0	88.2	92.4	3.07	3.0	-0.7	341	Hard, Sandy silt to sandy clay			30	5.81	6.14	38 - 57	40 - 60
17.5	131.4	137.1	4.12	2.1	-0.3	398	Very dense, Silty sand to sandy silt	37-40	80-100				38 - 57	40 - 60
18.0	213.2	221.7	1.83	0.7	-0.6	439	Dense, Sand to silty sand	42-46	60-80				38 - 58	40 - 60
18.5	272.9	282.8	1.22	0.6	-0.8	726	Dense, Sand to silty sand	42-46	60-80				39 - 58	40 - 60
19.0	123.5	127.5	6.20	3.0	-0.6	321	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				58 - 96	60 - 99
19.5	196.5	202.2	6.07	3.1	-0.4	459	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 97	+ 100
20.0	239.5	245.8	5.11	1.4	9.6	470	Dense, Sand to silty sand	42-46	60-80				59 - 97	60 - 99
20.5	494.8	505.6	7.51	1.4	-0.3	426	Very dense, Sandy gravel to silty gravelly sand	42-46	+100				+ 98	+ 100

\* Indicates lightly overconsolidated soil

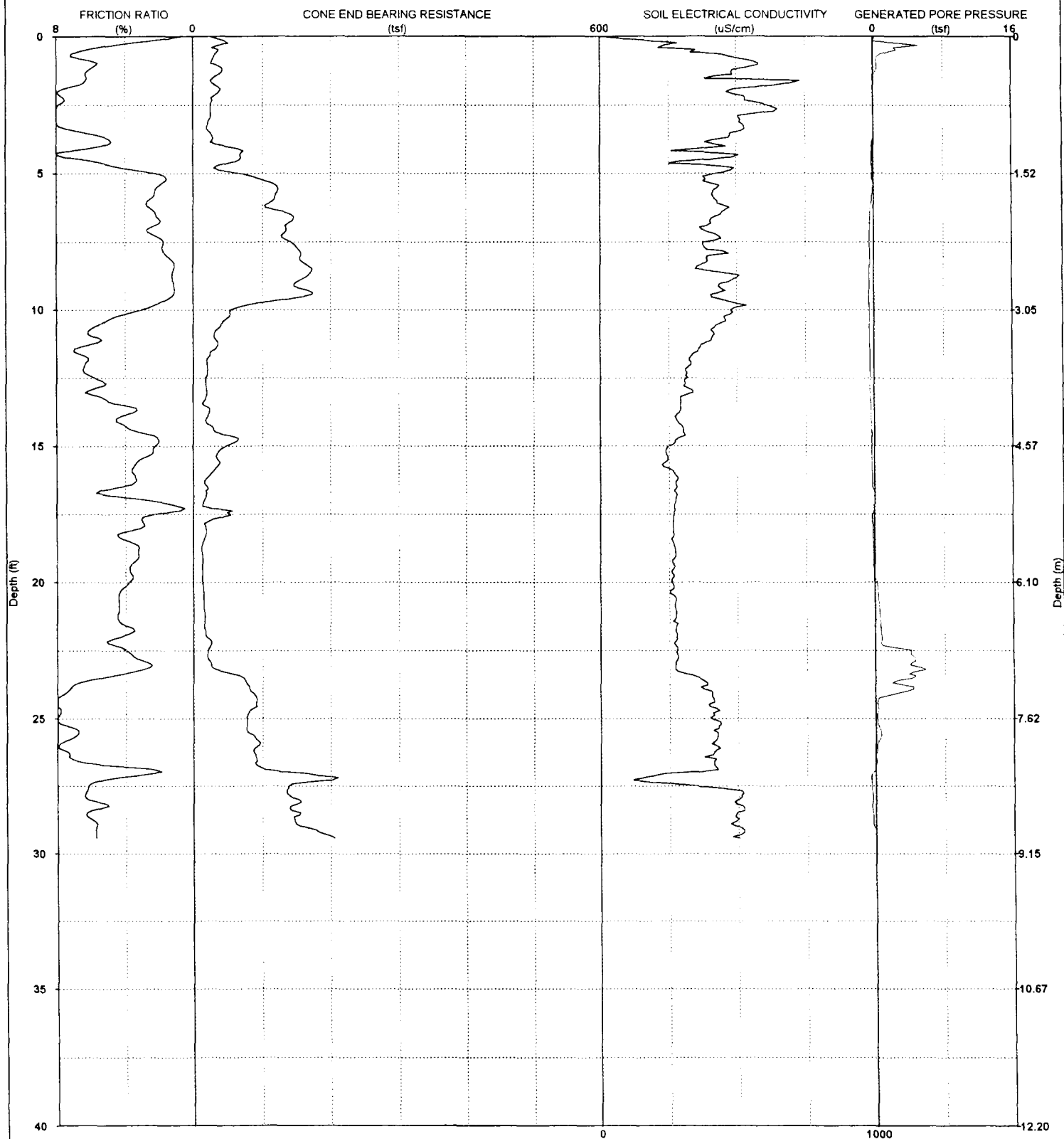
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:12:06:43.64

SOUNDING NUMBER:CP-031

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	37.1	59.8	2.24	5.6	0.5	614	Very stiff, Sandy clay to silty clay **			30	2.47	4.49	25 - 37	40 - 60
1.5	29.1	44.4	2.26	6.3	-0.2	392	Very stiff, Sandy clay to silty clay **			25	2.32	4.53	26 - 39	40 - 60
2.0	38.1	55.6	2.61	7.9	-0.1	466	Very stiff, Sandy clay to silty clay **			24	3.16	5.22	41 - 68	60 - 99
2.5	25.2	35.6	2.36	8.0	-0.1	617	Very stiff, Silty clay to clay			21	2.38	4.71	28 - 42	40 - 60
3.0	23.8	32.6	2.16	8.6	-0.0	513	Very stiff, Silty clay to clay			21	2.24	4.32	29 - 44	40 - 60
3.5	24.3	32.5	1.91	6.4	-0.1	488	Stiff, Silty clay to clay *			25	1.93	3.82	22 - 30	30 - 40
4.0	48.2	63.1	3.55	5.4	-0.3	463	Very stiff, Sandy clay to silty clay **			30	3.19	7.10	31 - 46	40 - 60
4.5	66.1	84.8	4.18	6.3	-0.3	376	Hard, Sandy clay to silty clay **			30	4.39	8.36	+ 78	+ 100
5.0	67.0	84.6	2.15	2.3	-0.2	430	Dense, Silty sand to sandy silt	36-37	60-80				24 - 32	30 - 40
5.5	122.0	151.4	2.55	2.1	-0.1	431	Very dense, Silty sand to sandy silt	37-40	80-100				32 - 48	40 - 60
6.0	114.6	140.0	3.24	2.7	-0.3	430	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				49 - 81	60 - 99
6.5	143.7	173.1	3.08	2.2	-0.5	438	Very dense, Silty sand to sandy silt	37-40	80-100				50 - 82	60 - 99
7.0	135.0	160.4	3.78	2.6	-0.6	370	Very dense, Gravelly silty sand to clayey gravelly sand	37-40	80-100				50 - 83	60 - 99
7.5	141.9	166.5	2.64	1.8	-0.6	388	Dense, Silty sand to sandy silt	40-42	60-80				34 - 51	40 - 60
8.0	156.3	181.2	2.56	1.6	-0.6	395	Dense, Sand to silty sand	40-42	60-80				35 - 52	40 - 60
8.5	173.5	198.8	1.89	1.2	-0.6	366	Dense, Sand to silty sand	42-46	60-80				35 - 52	40 - 60
9.0	148.7	168.6	1.91	1.2	-0.6	454	Dense, Sand to silty sand	40-42	60-80				35 - 53	40 - 60
9.5	164.0	184.0	1.99	1.3	-0.6	408	Dense, Sand to silty sand	42-46	60-80				36 - 53	40 - 60
10.0	54.3	60.4	3.00	3.1	-0.6	478	Hard, Sandy silt to sandy clay			25	4.30	6.00	18 - 27	20 - 30
10.5	41.1	45.5	2.63	5.4	-0.6	437	Very stiff, Sandy clay to silty clay **			25	3.24	5.25	27 - 36	30 - 40
11.0	30.2	33.3	2.01	5.8	-0.6	411	Very stiff, Silty clay to clay *			25	2.37	4.01	18 - 27	20 - 30
11.5	26.9	29.5	2.32	7.0	-0.6	359	Very stiff, Silty clay to clay *			21	2.50	4.63	27 - 37	30 - 40
12.0	19.7	21.5	1.39	6.4	-0.5	332	Stiff, Silty clay to clay *			20	1.90	2.78	14 - 18	15 - 20
12.5	17.4	19.0	1.14	5.8	-0.5	316	Stiff, Silty clay to clay *			20	1.67	2.27	09 - 14	10 - 15
13.0	19.7	21.3	1.15	6.3	-0.5	339	Stiff, Silty clay to clay *			20	1.89	2.30	14 - 18	15 - 20
13.5	15.0	16.1	0.84	4.1	-0.4	293	Stiff, Silty clay to clay *			15	1.89	1.68	06 - 09	06 - 10
14.0	18.2	19.5	1.14	4.5	-0.4	277	Stiff, Silty clay to clay *			20	1.74	2.28	09 - 14	10 - 15
14.5	33.6	35.6	1.65	3.1	-0.4	303	Very stiff, Sandy clay to silty clay *			25	2.61	3.30	14 - 19	15 - 20
15.0	47.1	50.1	1.21	2.3	-0.4	254	Dense, Silty sand to sandy silt	27-31	60-80				14 - 19	15 - 20
15.5	35.5	37.6	1.19	3.1	-0.4	247	Very stiff, Sandy clay to silty clay *			25	2.77	2.38	14 - 19	15 - 20
16.0	25.6	27.0	1.17	3.5	-0.3	270	Very stiff, Sandy clay to silty clay *			20	2.47	2.34	09 - 14	10 - 15
16.5	20.2	21.3	0.82	4.4	-0.3	279	Stiff, Silty clay to clay *			20	1.93	1.63	10 - 14	10 - 15
17.0	15.0	15.7	0.70	2.6	-0.1	274	Stiff, Sandy clay to silty clay *			15	1.86	1.40	04 - 06	04 - 06
17.5	53.2	55.5	0.77	2.2	-0.3	268	Dense, Silty sand to sandy silt	27-31	60-80				14 - 19	15 - 20
18.0	18.0	18.7	0.77	3.1	-0.3	267	Very stiff, Sandy clay to silty clay *			15	2.25	1.54	06 - 10	06 - 10
18.5	13.5	14.0	0.62	3.7	-0.2	265	Stiff, Silty clay to clay *			15	1.65	1.24	04 - 06	04 - 06
19.0	12.3	12.7	0.41	3.3	-0.2	275	Stiff, Silty clay to clay *			15	1.49	0.82	04 - 06	04 - 06
19.5	12.9	13.3	0.48	3.7	-0.2	268	Stiff, Silty clay to clay *			15	1.57	0.96	04 - 06	04 - 06
20.0	12.9	13.2	0.53	3.8	0.2	262	Stiff, Silty clay to clay *			15	1.56	1.06	04 - 06	04 - 06
20.5	14.4	14.7	0.64	4.4	0.3	268	Stiff, Silty clay to clay *			15	1.76	1.29	06 - 10	06 - 10
21.0	15.0	15.3	0.68	4.4	0.4	273	Stiff, Silty clay to clay *			15	1.64	1.35	06 - 10	06 - 10
21.5	15.5	15.8	0.72	4.3	0.5	277	Stiff, Silty clay to clay *			15	1.90	1.44	06 - 10	06 - 10
22.0	18.6	18.8	0.97	4.3	0.7	277	Very stiff, Silty clay to clay *			15	2.31	1.94	06 - 10	06 - 10
22.5	20.7	20.8	0.92	3.9	4.1	279	Stiff, Silty clay to clay *			20	1.93	1.83	06 - 10	06 - 10
23.0	25.3	25.4	1.05	2.5	4.0	272	Very stiff, Sandy silt to sandy clay			20	2.39	2.10	06 - 10	06 - 10
23.5	71.5	71.6	4.11	5.3	4.3	357	Hard, Sandy clay to silty clay **			30	4.67	8.22	60 - 99	60 - 99
24.0	83.5	83.4	6.64	7.4	3.5	407	Hard, Sandy clay to silty clay **			24	6.84	13.28	+ 100	+ 100
24.5	91.0	90.6	7.33	8.1	0.2	395	Hard, Sandy clay to silty clay **			24	7.46	14.67	+ 100	+ 100
25.0	77.1	76.5	6.70	8.1	0.2	406	Hard, Sandy clay to silty clay **			24	6.30	13.41	+ 101	+ 100

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\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:12:06:43.64

SOUNDING NUMBER:CP-031

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
25.5	78.8	77.9	6.05	6.8	0.5	423	Hard, Sandy clay to silty clay **			30	5.15	12.10	+ 101	+ 100
26.0	93.9	92.7	7.28	8.0	0.1	423	Hard, Hardpan to weak rock			24	7.70	14.56	+ 101	+ 100
26.5	91.4	89.9	7.14	7.1	0.1	419	Hard, Sandy clay to silty clay **			30	5.99	14.28	+ 102	+ 100
27.0	144.6	141.8	3.03	2.1	-0.4	301	Very dense, Silty sand to sandy silt	37-40	80-100				41 - 61	40 - 60
27.5	139.8	136.7	10.69	6.2	-0.5	342	Hard, Hardpan to weak rock			33	8.37	21.39	+ 102	+ 100
28.0	153.7	149.9	9.50	6.2	-0.4	498	Hard, Hardpan to weak rock			33	9.22	19.00	+ 103	+ 100
28.5	155.7	151.4	9.66	6.3	-0.4	495	Hard, Hardpan to weak rock			33	9.33	19.33	+ 103	+ 100
29.0	160.4	155.5	10.70	5.7	-0.3	500	Hard, Hardpan to weak rock			33	9.62	21.41	+ 103	+ 100

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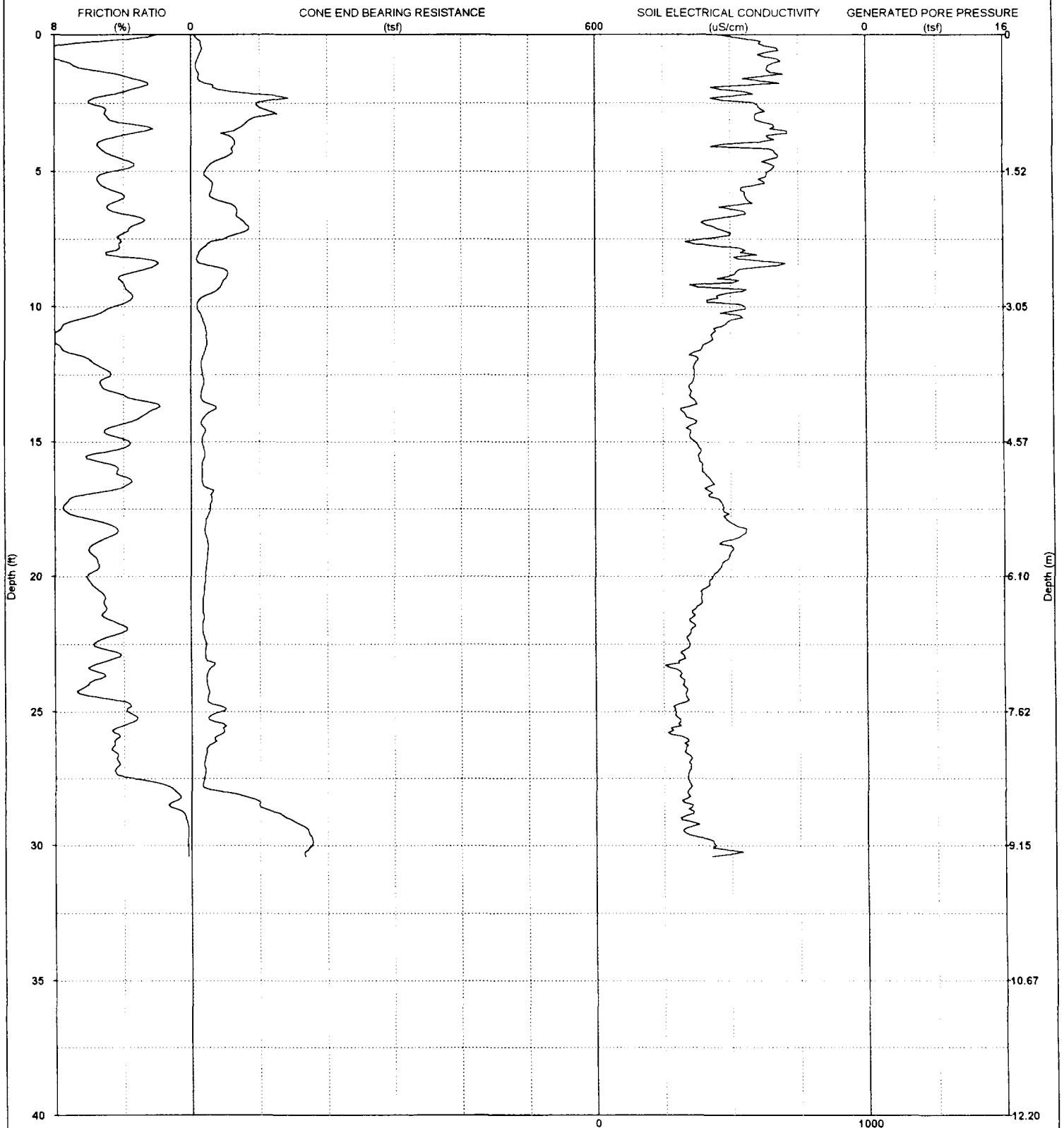
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:13:16:12.38

SOUNDING NUMBER:CP-032

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	6.1	9.8	0.86	7.4	0.0	650	Firm, Silty clay to clay *			14	0.86	1.31	04 - 06	06 - 10
1.5	10.8	16.4	0.87	4.0	0.0	638	Stiff, Silty clay to clay *			15	1.43	1.73	04 - 07	06 - 10
2.0	39.6	57.8	3.51	3.5	0.0	467	Very stiff, Sandy clay to silty clay *			25	3.16	7.02	14 - 21	20 - 30
2.5	97.0	137.0	6.48	5.9	0.0	592	Hard, Hardpan to weak rock			33	5.87	12.96	+ 71	+ 100
3.0	99.8	137.0	5.23	5.0	0.0	592	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.04	10.46	+ 73	+ 100
3.5	63.1	84.5	1.97	2.6	0.0	695	Dense, Silty sand to sandy silt	36-37	60-80					
4.0	63.6	83.3	3.32	5.6	0.0	473	Hard, Sandy clay to silty clay **			30	4.22	6.64	22 - 30	30 - 40
4.5	47.0	60.4	2.44	4.2	0.0	667	Very stiff, Gravelly sandy clay to gravelly silty clay **			30	3.12	4.89	+ 76	+ 100
5.0	19.6	24.7	1.35	4.6	0.0	642	Stiff, Silty clay to clay *			20	1.93	2.69	31 - 47	40 - 60
5.5	30.9	38.3	1.55	5.3	0.0	598	Very stiff, Silty clay to clay *			25	2.45	3.10	08 - 12	10 - 15
6.0	31.8	38.9	2.15	4.0	0.0	562	Very stiff, Sandy clay to silty clay *			25	2.52	4.30	16 - 24	20 - 30
6.5	67.2	80.9	3.29	4.5	0.0	556	Hard, Gravelly sandy clay to gravelly silty clay **			30	4.45	6.58	16 - 25	20 - 30
7.0	81.7	97.1	2.52	3.4	0.0	424	Hard, Gravelly clayey sand to gravelly sandy silt			30	5.42	5.04	50 - 82	60 - 99
7.5	48.3	56.7	2.93	4.2	0.0	407	Very stiff, Sandy clay to silty clay *			25	3.83	5.86	34 - 50	40 - 60
8.0	10.5	12.2	1.16	5.1	0.0	539	Stiff, Silty clay to clay *			15	1.33	2.32	26 - 34	30 - 40
8.5	28.3	32.4	0.99	2.2	0.0	654	Very stiff, Sandy silt to sandy clay			20	2.78	1.98	05 - 09	06 - 10
9.0	48.3	54.8	2.02	4.2	0.0	492	Very stiff, Sandy clay to silty clay *			25	3.82	4.04	05 - 09	06 - 10
9.5	30.2	33.9	1.45	3.6	0.0	498	Very stiff, Sandy clay to silty clay *			25	2.37	2.90	26 - 35	30 - 40
10.0	7.8	8.7	0.64	4.8	0.0	557	Stiff, Silty clay to clay *			25	2.37	2.90	13 - 18	15 - 20
10.5	16.7	18.5	1.36	6.9	0.0	499	Stiff, Silty clay to clay *			10	1.44	1.28	04 - 05	04 - 06
11.0	21.7	23.9	1.77	8.1	0.0	432	Very stiff, Silty clay to clay *			18	1.79	2.72	14 - 18	15 - 20
11.5	21.2	23.2	1.87	7.7	0.0	396	Very stiff, Silty clay to clay *			18	2.34	3.55	18 - 27	20 - 30
12.0	14.9	16.2	1.04	5.9	0.0	375	Stiff, Silty clay to clay *			18	2.28	3.34	18 - 27	20 - 30
12.5	16.5	18.0	0.82	4.7	0.0	367	Very stiff, Silty clay to clay *			15	1.88	2.08	09 - 14	10 - 15
13.0	16.0	17.3	0.92	5.2	0.0	348	Very stiff, Silty clay to clay *			15	2.10	1.63	06 - 09	06 - 10
13.5	17.6	18.9	0.75	2.7	0.0	371	Very stiff, Sandy clay to silty clay *			15	2.03	1.83	09 - 14	10 - 15
14.0	21.1	22.6	0.78	2.8	0.0	334	Very stiff, Sandy clay to silty clay *			15	2.24	1.49	04 - 06	04 - 06
14.5	19.8	21.1	0.90	4.9	0.0	341	Stiff, Silty clay to clay *			20	2.02	1.56	06 - 09	06 - 10
15.0	16.2	17.2	0.64	3.6	0.0	370	Very stiff, Silty clay to clay *			20	1.89	1.80	09 - 14	10 - 15
15.5	19.2	20.3	1.14	6.1	0.0	381	Stiff, Silty clay to clay *			15	2.04	1.29	06 - 09	06 - 10
16.0	15.1	15.9	0.67	4.3	0.0	396	Stiff, Silty clay to clay *			20	1.83	2.29	14 - 19	15 - 20
16.5	16.0	16.8	0.85	3.6	0.0	433	Stiff, Silty clay to clay *			15	1.88	1.34	06 - 09	06 - 10
17.0	28.7	30.1	1.94	6.7	0.0	419	Very stiff, Silty clay to clay *			25	2.00	1.70	06 - 10	06 - 10
17.5	27.6	28.8	2.11	7.5	0.0	473	Very stiff, Silty clay to clay *			25	2.21	3.89	19 - 29	20 - 30
18.0	20.6	21.4	1.24	5.2	0.0	498	Stiff, Silty clay to clay *			21	2.53	4.22	29 - 38	30 - 40
18.5	21.1	21.8	1.10	4.8	0.0	537	Stiff, Silty clay to clay *			20	1.95	2.48	10 - 14	10 - 15
19.0	24.1	24.9	1.42	6.1	0.0	507	Very stiff, Silty clay to clay *			20	2.00	2.20	10 - 14	10 - 15
19.5	22.0	22.6	1.27	5.5	0.0	470	Very stiff, Silty clay to clay *			20	2.30	2.84	19 - 29	20 - 30
20.0	20.8	21.3	1.31	6.2	0.0	434	Stiff, Silty clay to clay *			20	2.08	2.53	15 - 19	15 - 20
20.5	18.9	19.4	1.08	5.5	0.0	395	Stiff, Silty clay to clay *			20	1.96	2.62	15 - 20	15 - 20
21.0	16.9	17.2	0.92	5.2	0.0	392	Very stiff, Silty clay to clay *			20	1.77	2.16	10 - 15	10 - 15
21.5	18.6	18.9	0.92	5.2	0.0	361	Stiff, Silty clay to clay *			15	2.09	1.84	10 - 15	10 - 15
22.0	15.9	16.1	0.69	3.8	0.0	350	Stiff, Silty clay to clay *			20	1.73	1.83	10 - 15	10 - 15
22.5	21.8	22.0	1.20	5.8	0.0	347	Very stiff, Silty clay to clay *			15	1.94	1.38	06 - 10	06 - 10
23.0	20.4	20.5	1.18	4.4	0.0	329	Stiff, Silty clay to clay *			20	2.04	2.40	15 - 20	15 - 20
23.5	24.2	24.3	1.53	5.7	0.0	310	Very stiff, Silty clay to clay *			20	1.91	2.36	10 - 15	10 - 15
24.0	22.6	22.5	1.47	6.1	0.0	322	Very stiff, Silty clay to clay *			20	2.28	3.06	15 - 20	15 - 20
24.5	23.0	22.9	1.74	5.1	0.0	338	Very stiff, Silty clay to clay *			20	2.11	2.94	15 - 20	15 - 20
25.0	41.9	41.6	1.36	3.8	0.0	292	Very stiff, Sandy clay to silty clay *			20	2.15	3.49	15 - 20	15 - 20
										25	3.23	2.72	20 - 30	20 - 30

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**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:13:16:12.38

SOUNDING NUMBER:CP-032

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
25.5	49.1	48.6	1.72	4.0	0.0	311	Very stiff, Sandy clay to silty clay *			25	3.80	3.44	20 - 30	20 - 30
26.0	32.9	32.4	1.93	4.4	0.0	337	Very stiff, Silty clay to clay *			25	2.50	3.86	15 - 20	15 - 20
26.5	21.5	21.1	1.18	4.5	0.0	327	Stiff, Silty clay to clay *			20	1.99	2.36	10 - 15	10 - 15
27.0	18.0	17.7	0.82	4.3	0.0	349	Very stiff, Silty clay to clay *			15	2.19	1.64	06 - 10	06 - 10
27.5	17.4	17.0	0.75	3.5	0.0	338	Very stiff, Silty clay to clay *			15	2.10	1.51	06 - 10	06 - 10
28.0	45.7	44.6	0.76	0.9	0.0	335	Loose, Silty sand to sandy silt	36-37	20-40				06 - 10	06 - 10
28.5	99.9	97.1	1.78	1.3	0.0	355	Medium dense, Sand to silty sand	37-40	40-60				21 - 31	20 - 30
29.0	143.5	139.1	0.53	0.3	0.0	313	Medium dense, Sand to silty sand	42-46	40-60				21 - 31	20 - 30
29.5	172.4	166.7	0.37	0.2	0.0	325	Medium dense, Sand to silty sand	42-46	40-60				31 - 41	30 - 40
30.0	177.3	171.0	0.37	0.2	0.0	442	Medium dense, Sand to silty sand	42-46	40-60				31 - 41	30 - 40

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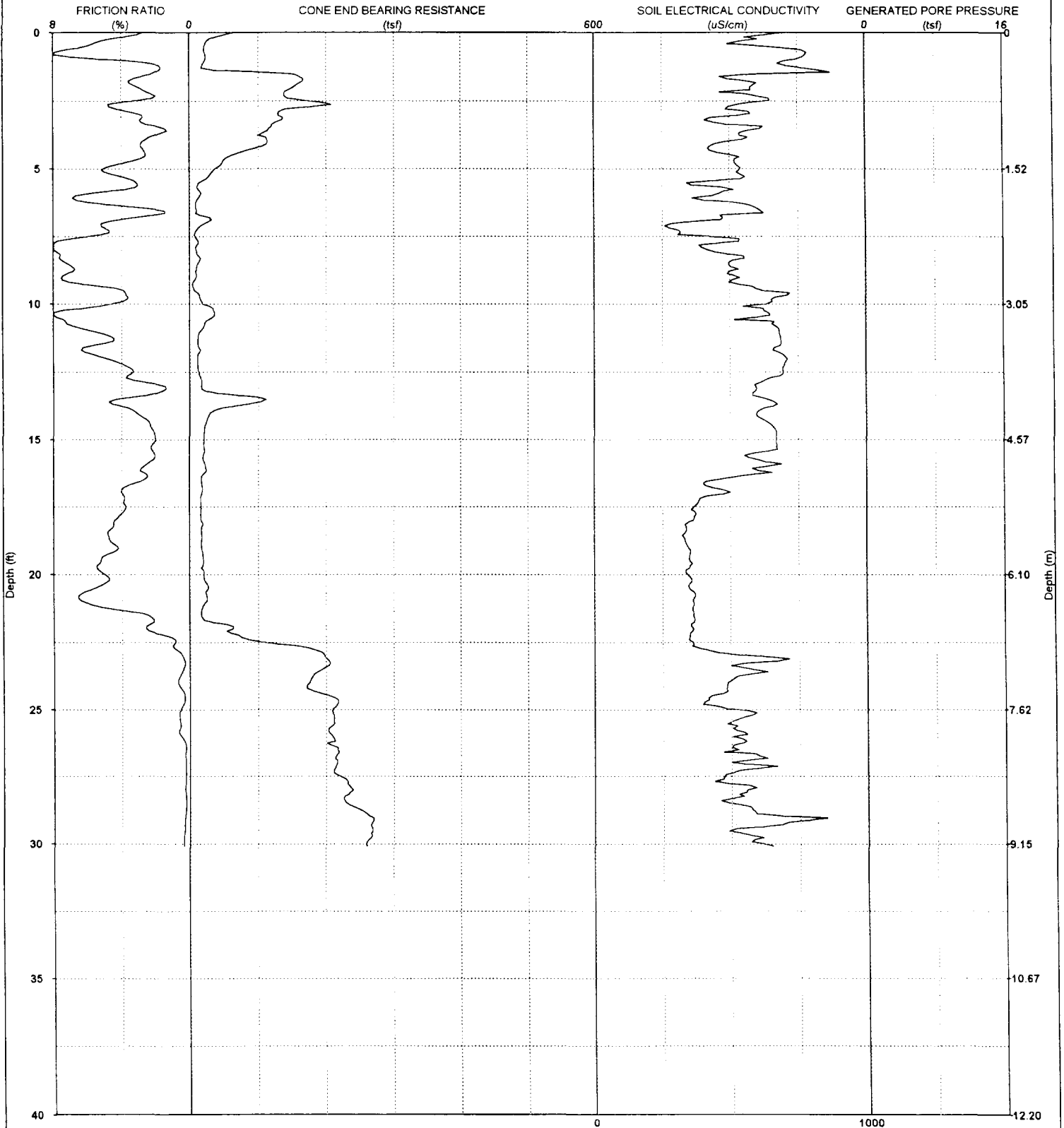
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# CPT-EC LOG



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:13:43:58.98

SOUNDING NUMBER:CP-033

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1')
1.0	23.2	37.4	1.67	3.1	0.0	635	Stiff, Sandy clay to silty clay *			25	1.85	3.33	09 - 12	15 - 20
1.5	140.8	214.4	3.41	2.2	0.0	648	Very dense, Gravelly silty sand to clayey gravelly sand	40-42	80-100				+ 66	+ 100
2.0	151.5	221.3	4.70	3.0	0.0	576	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 68	+ 100
2.5	175.2	247.4	5.32	3.3	0.0	628	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 71	+ 100
3.0	129.1	177.2	4.49	3.0	0.0	555	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				+ 73	+ 100
3.5	116.4	155.9	1.69	1.6	0.0	614	Dense, Sand to silty sand	40-42	60-80				30 - 45	40 - 60
4.0	113.4	148.5	3.12	2.8	0.0	482	Very dense, Gravelly silty sand to clayey gravelly sand	36-37	+100				46 - 76	60 - 99
4.5	61.5	79.0	2.33	2.6	0.0	513	Dense, Silty sand to sandy silt	27-31	60-80				23 - 31	30 - 40
5.0	37.4	47.2	2.49	5.1	0.0	539	Very stiff, Sandy clay to silty clay **			25	2.97	4.98	24 - 32	30 - 40
5.5	14.7	18.3	0.84	3.2	0.0	371	Stiff, Sandy clay to silty clay *			15	1.92	1.67	03 - 05	04 - 06
6.0	14.8	18.1	0.94	6.7	0.0	437	Very stiff, Silty clay to clay *			14	2.06	1.88	12 - 16	15 - 20
6.5	9.4	11.3	0.35	2.0	0.0	608	Stiff, Clayey silt to silty clay			15	1.20	0.70	00 - 02	00 - 02
7.0	23.5	27.9	1.00	5.0	0.0	317	Very stiff, Silty clay to clay *			20	2.30	1.99	13 - 17	15 - 20
7.5	7.7	9.1	0.68	5.9	0.0	409	Stiff, Silty clay to clay *			14	1.04	1.36	03 - 05	04 - 06
8.0	9.1	10.5	1.01	8.1	0.0	418	Stiff, Silty clay to clay *			14	1.23	2.02	05 - 09	06 - 10
8.5	12.1	13.9	0.87	7.2	0.0	498	Stiff, Silty clay to clay *			14	1.68	1.74	09 - 13	10 - 15
9.0	9.6	10.9	0.76	7.5	0.0	530	Stiff, Silty clay to clay *			14	1.29	1.52	05 - 09	06 - 10
9.5	7.0	7.9	0.54	4.0	0.0	614	Stiff, Silty clay to clay *			10	1.29	1.08	02 - 04	02 - 04
10.0	18.8	20.9	1.43	4.5	0.0	636	Stiff, Silty clay to clay *			20	1.82	2.86	09 - 14	10 - 15
10.5	31.9	35.3	2.46	7.7	0.0	578	Very stiff, Silty clay to clay			21	2.98	4.91	36 - 54	40 - 60
11.0	15.4	17.0	1.25	5.7	0.0	681	Stiff, Silty clay to clay *			15	1.97	2.51	09 - 14	10 - 15
11.5	12.0	13.1	0.72	5.5	0.0	685	Stiff, Silty clay to clay *			15	1.50	1.44	05 - 09	06 - 10
12.0	11.5	12.5	0.63	4.9	0.0	709	Stiff, Silty clay to clay *			15	1.43	1.26	06 - 09	06 - 10
12.5	12.8	13.9	0.52	3.4	0.0	694	Stiff, Silty clay to clay *			15	1.60	1.04	04 - 06	04 - 06
13.0	16.9	18.3	0.69	1.6	0.0	592	Very stiff, Sandy silt to clayey silt			15	2.15	1.37	04 - 06	04 - 06
13.5	108.3	116.7	2.98	4.1	0.0	631	Hard, Gravelly sandy clay to gravelly silty clay **			33	6.52	5.95	+ 93	+ 100
14.0	29.9	32.1	2.14	3.2	0.0	596	Very stiff, Sandy clay to silty clay *			20	2.91	4.28	09 - 14	10 - 15
14.5	22.0	23.5	0.59	2.3	0.0	655	Very stiff, Sandy silt to sandy clay			20	2.12	1.18	06 - 09	06 - 10
15.0	21.1	22.5	0.42	2.0	0.0	669	Very stiff, Sandy silt to sandy clay			20	2.02	0.84	04 - 06	04 - 06
15.5	21.1	22.4	0.45	2.1	0.0	597	Very stiff, Sandy silt to sandy clay			20	2.02	0.89	04 - 06	04 - 06
16.0	22.9	24.2	0.55	2.7	0.0	640	Very stiff, Sandy clay to silty clay *			20	2.19	1.10	06 - 09	06 - 10
16.5	16.9	17.8	0.56	2.8	0.0	451	Very stiff, Sandy clay to silty clay *			15	2.13	1.13	04 - 06	04 - 06
17.0	17.5	18.3	0.73	4.0	0.0	489	Very stiff, Silty clay to clay *			15	2.20	1.46	06 - 10	06 - 10
17.5	16.7	17.4	0.62	3.8	0.0	369	Very stiff, Silty clay to clay *			15	2.08	1.23	06 - 10	06 - 10
18.0	16.0	16.6	0.75	4.4	0.0	365	Stiff, Silty clay to clay *			15	1.99	1.50	06 - 10	06 - 10
18.5	17.2	17.8	0.84	4.8	0.0	330	Very stiff, Silty clay to clay *			15	2.14	1.67	06 - 10	06 - 10
19.0	16.9	17.5	0.77	4.2	0.0	346	Very stiff, Silty clay to clay *			15	2.10	1.54	06 - 10	06 - 10
19.5	19.7	20.3	1.00	5.2	0.0	351	Stiff, Silty clay to clay *			20	1.86	2.00	10 - 15	10 - 15
20.0	20.6	21.1	1.18	5.0	0.0	343	Stiff, Silty clay to clay *			20	1.94	2.36	10 - 15	10 - 15
20.5	27.1	27.6	1.39	5.6	0.0	350	Very stiff, Silty clay to clay *			20	2.58	2.78	20 - 29	20 - 30
21.0	23.9	24.4	1.57	6.3	0.0	364	Very stiff, Silty clay to clay *			20	2.27	3.13	20 - 29	20 - 30
21.5	16.9	17.1	0.88	2.5	0.0	364	Very stiff, Sandy clay to silty clay *			15	2.08	1.76	04 - 06	04 - 06
22.0	63.6	64.3	1.94	2.6	0.0	365	Hard, Sandy silt to sandy clay			25	4.98	3.88	20 - 30	20 - 30
22.5	109.7	110.6	1.43	0.9	0.0	362	Medium dense, Sand to silty sand	40-42	40-60				20 - 30	20 - 30
23.0	198.5	199.5	0.94	0.5	0.0	575	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60
23.5	195.3	195.6	0.77	0.4	0.0	571	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60
24.0	175.7	175.5	1.32	0.7	0.0	489	Medium dense, Sand to silty sand	42-46	40-60				40 - 60	40 - 60
24.5	207.3	206.4	0.67	0.3	0.0	427	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				40 - 60	40 - 60
25.0	210.0	208.4	1.18	0.6	0.0	523	Dense, Sand to silty sand	42-46	60-80				40 - 60	40 - 60

\* Indicates lightly overconsolidated soil

\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
Both undrained and drained parameters can be estimated for these soils.

Structure rate of loading should be considered in choosing which strength parameters to use for design.  
Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.



**STRATIGRAPHICS Evaluated Properties Using Global Database**

PROJECT NAME:ECC 21-6585B

PROJECT NUMBER:02-120-080

R2DATE: 5-23-2002 TIME:13:43:58.98

SOUNDING NUMBER:CP-033

Depth (ft)	Cone (tsf)	Norm Cone (tsf)	Friction (tsf)	Averaged Friction Ratio (%)	Generated Pore Water Pressure (tsf)	Soil Conductivity (uS/cm)	Evaluated Soil Type	Drained Friction Angle (deg)	Relative Density (%)	Nc	Undrained Shear Strength (ksf)	Undrained Large Strain Shear Strength (ksf)	SPT (N)	NORM SPT (N1)
25.5	212.3	210.1	1.27	0.6	0.0	491	Dense, Sand to silty sand	42-46	60-80				40 - 61	40 - 60
26.0	210.9	208.1	1.07	0.5	0.0	506	Medium dense, Sand to silty sand	42-46	40-60				41 - 61	40 - 60
26.5	217.7	214.1	0.50	0.3	0.0	514	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				41 - 61	40 - 60
27.0	216.8	212.6	0.62	0.3	0.0	525	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				41 - 61	40 - 60
27.5	221.5	216.6	0.61	0.3	0.0	476	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				41 - 61	40 - 60
28.0	240.6	234.6	0.67	0.3	0.0	556	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				41 - 62	40 - 60
28.5	232.2	225.7	0.55	0.2	0.0	503	Medium dense, Sandy gravel to gravelly sand	42-46	40-60				41 - 62	40 - 60
29.0	267.9	259.7	0.77	0.3	0.0	767	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
29.5	269.3	260.3	0.88	0.3	0.0	498	Dense, Sandy gravel to gravelly sand	+46	60-80				41 - 62	40 - 60
30.0	258.4	249.1	0.78	0.4	0.0	618	Dense, Sandy gravel to gravelly sand	42-46	60-80				41 - 62	40 - 60

\* Indicates lightly overconsolidated soil

\*\* Indicates heavily overconsolidated or cemented soil

Mixed soils containing both granular and fine grained particles (e.g. clayey sands) may undergo partial drained failure during CPT.  
Both undrained and drained parameters can be estimated for these soils.

Structure rate of loading should be considered in choosing which strength parameters to use for design.

Drained and undrained parameters must not be combined as such combination will result in significant overprediction of in situ shear strength.

## APPENDIX A

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#### 1.0 EVALUATION OF GEOTECHNICAL PARAMETERS

CPT data have been correlated with soil type, drained friction angle, undrained shear strength, relative density, and equivalent SPT blowcounts, among others. Correlations have been developed by comparing CPT results to laboratory tests on drilled samples and to other in situ tests, such as vane and pressuremeter. Laboratory CPT testing on large scale samples of known composition and classical bearing capacity and cavity expansion theory have also been used. Site specific information, where available, can be used to fine tune correlations.

A two parameter correlation scheme has proved useful for CPT data evaluation. Geotechnical properties often exhibit well defined trends when plotted against the logarithm of the CPT cone end bearing resistance and friction ratio. For instance, increased grain size increases cone end bearing resistance, while increased plasticity and compressibility increase friction ratio. A chart illustrating these and other trends is presented in Figure A2. A discussion of CPT data evaluation is presented in Douglas and Olsen, 1981.

**A1.1 CPT Soil Behavior Types** CPT soil behavior type correlations (Figure A3) have been developed from geotechnical theory and comparisons of borehole data with CPT data (Douglas and Olsen, 1981). The CPT soil type tabulations are indicative of the response of the soil to the large shear deformations imposed on the soil during penetrometer advance. Soil shear response is not entirely controlled by grain size distribution. However, it has been found that CPT soil types generally agree with classifications based on soil grain size distribution methods such as the Unified Soil Classification System (USCS).

**A1.2 CPT Relative Density** Relative densities of granular soils are correlated with CPT data (Figure A4) on the basis of laboratory CPT on large scale samples of known composition (Schmertmann, 1978, and Villet and Mitchell, 1981). The effect of soil fines content has been empirically accounted for by extrapolating trends in the two parameter correlation model (Douglas and Strutynsky, 1984).

**A1.3 CPT Drained Static Strength** Drained friction angles have been correlated with CPT data (Figure A4) on the basis of CPT soundings and laboratory tests on drilled samples, and on theoretical analyses of the cone end bearing capacity problem (Schmertmann, 1978, Durgunoglu and Mitchell, 1974, and Villet and Mitchell, 1981). The effect of soil fines content on friction angles has been accounted for by extrapolating trends in the two parameter correlation model, as was done for the relative density correlation.

**A1.4 CPT Undrained Static Strength** The correlation between CPT data and undrained shear strength has been extensively studied (Douglas and others, 1984, Lunne and others, 1976, Sanglerat, 1972, and Schmertmann, 1978). The following bearing capacity equation can be used for computing undrained shear strength from CPT data:  $q_u = (S_u * N_c) + S_v$  (Eq. A1); where:  $q_u$  = ultimate bearing capacity;  $S_u$  = undrained shear strength;  $N_c$  = a dimensionless bearing capacity factor; and  $S_v$  = the estimated total vertical stress. By setting  $q_u$  equal to the cone end bearing resistance,  $q_c$ , and rearranging the equation, a value of the undrained shear strength can be computed as:  $S_u = (q_c - S_v) / N_k$  ( $N_k$  is equivalent to  $N_c$  in Eq. A1) (Eq. A2).

The primary difficulty in using this equation has been the selection of  $N_k$  applicable to cone penetration in a particular soil. Bearing capacity and cavity expansion theory and other in situ and laboratory test results performed adjacent to CPT soundings have been used to calculate  $N_k$  values. These  $N_k$  values have ranged from 5 to over 25, but are most often between about 12 and 20. Higher  $N_k$  values are typically associated with overconsolidated clays and lower plasticity clays and clayey silts.

A compilation of  $N_k$  values as a function of cone end bearing resistance and friction ratio is presented in Figure A5. This figure was developed from comparisons of CPT to results of laboratory consolidated-undrained (CU) strength tests. This is important to note as undrained shear strength is not a unique property of a soil - it is test type and stress path dependent.

Many design methodologies are based on a particular strength test on a particular type of sample. These semi-empirical design methods are successfully used by experienced designers. Engineering judgment must be applied in using the results of any type of testing to assure both adequate safety and design economy.

High Strain, Remolded Strength Another measure of the in situ undrained shear strength is provided by the CPT friction sleeve resistance. The friction sleeve interacts with soil that has already undergone bearing capacity failure induced by the tip of the penetrometer. Thus, the friction sleeve resistance is a measure of soil large strain, remolded strength. The ratio between strengths calculated from the cone end bearing and from the friction sleeve is indicative of soil sensitivity.

In moderately to highly overconsolidated, non-sensitive clays, friction sleeve resistances can indicate higher strengths than those calculated using the cone end bearing resistance. This often reflects the dilative (strain hardening) nature of shear failure in overconsolidated soils. Engineering judgment must be applied in deciding which strain level, and thus which strength, is representative for the design problem to be solved.

A1.5 Evaluation of Soil Stress History The results of penetrometer testing can often be evaluated for indication of clay soil stress history or pre-consolidation pressure. Several methods are available for this evaluation. The first method consists of computing a normally consolidated cone end bearing resistance profile, based on estimated soil unit weights, water table information, cohesion at the ground surface, and an assumed c/p ratio and cone factor  $N_k$  for the clay strata in question. This normally consolidated profile is then compared to the measured profile, and differences between the two can be assumed to be due to past stress history events (Schmertmann, 1977). A back calculation is then performed on the difference, using the assumed c/p ratio and  $N_k$ , and a pre-consolidation pressure is calculated. OCR's can then be calculated based on estimated existing stress conditions. SHANSEP procedures used during triaxial testing of clay soils may be useful in this method, especially for definition of c/p ratios.

Other methods for estimating stress history from CPT data are summarized in Mayne (1991 and 1993). These include approaches based on cavity expansion theory and critical state soil mechanics or on empirical methods based on data sets, primarily from sites in offshore oil fields. Results from each method should be compared, and engineering judgment should be used to decide which method gives the most appropriate result for the design at hand.

A1.6 Equivalent SPT Blowcount N-Values An equivalent SPT blowcount can be correlated with CPT data by using an analytical model of the SPT procedure (Douglas and Olsen, 1981). This procedure has been checked by comparison to SPT results at various sites throughout the world (Douglas and others, 1981, Douglas and Strutytsky, 1984, and Olsen and Farr, 1986) with generally good results.

The particular SPT equipment used to develop the CPT-SPT correlation chart (Figure A6) consisted of a SPT trip hammer system. This SPT hammer is characterized by reasonably repeatable, measured hammer input energy efficiencies of about 60 to 70% (Douglas and Strutytsky, 1984). This hammer input energy level is similar to that recommended (Seed and others, 1984) as the "standard" Standard Penetration Test input energy. SPT results are both equipment and operator dependent. SPT hammer efficiencies have been measured to range from 35 to over 90% of the theoretical 4200 in-lbs (30 inch fall, 140 lbs hammer) SPT input energy. Variable SPT input energy results in variable blowcounts (Douglas and Strutytsky, 1984, Seed and others, 1984). Non-uniform SPT input energy is a limitation for use of SPT for quantitative design purposes.

The approach of using the extensive SPT data base by performing CPT and then deriving equivalent SPT blowcount N-values, can result in better site characterization. This is because CPT is continuous, has higher resolution, is less expensive, and is much more consistent and repeatable than SPT. The chart that was used for correlating CPT to SPT for this study is presented in Figure A6. After determining the overburden normalized equivalent SPT N'-value, the equivalent SPT blowcount N-value was calculated by dividing the overburden normalized value by the overburden normalization factor CN, as defined in Eq. A3.

The equivalent SPT N-values reflect the higher resolution of the CPT measurements as compared to actual SPT. Performance of actual SPT includes averaging of soil resistance over about a 24 inch interval (18 inch sampler embedment and 2 to 3 sampler diameters ahead of the sampler). Equivalent SPT values have a resolution of about six inches. Rather than coarsen the 6 inch resolution equivalent SPT N-value to fit a 24 inch resolution actual SPT N-value, equivalent values are based on point by point CPT data. These high resolution, equivalent SPT values should be more useful for design purposes, especially in interlayered deposits, where thin, weak soil seams cannot be adequately characterized by actual SPT blowcount methods. The high resolution equivalent SPT values and actual SPT measurements should be similar in thick homogeneous strata.

Discrepancies between CPT equivalent SPT N-values and actual, measured SPT N-values are often due to inconsistencies in the performance of actual SPT. Poor fit of CPT equivalent and actual SPT in weak soils with very low blowcounts (0 to 3) can be due to limited accuracy of high capacity CPT loadcells used at the extreme low end of their range, but are more likely caused by extensive borehole disturbance in easily disturbed soil, and set of the SPT sampler under the self-weight of the hammer and drillrods. Discrepancies between equivalent and actual SPT values in very dense or hard soils with high blowcounts, especially in gravelly soils, can be due to both erratic penetrometer or SPT sampler interaction with large soil particles, and basic differences in modes of penetration of the two techniques. Indications of weak soils, using any method, should strongly encourage additional testing, including undisturbed sampling and sophisticated laboratory testing.

## A2.0 OVERBURDEN PRESSURE NORMALIZATION

Overburden normalization of CPT data for correlation purposes is necessary in order to remove the effects of increasing overburden pressure with depth on measured results. Cone tip resistances can be normalized to an effective vertical overburden pressure of 1 TSF by using the following equations:  $qc_1 = qc \cdot CN$  (Eq. A3); and  $CN = 1.0 - 0.5 \cdot \log(S_v')$  (Eq. A4); where:  $qc_1$  is the overburden normalized cone tip resistance, in TSF;  $qc$  is the measured cone tip resistance, in TSF;  $CN$  is the overburden normalization factor; and  $S_v'$  is the effective vertical overburden stress in TSF.

Overburden normalization curves are variable (Douglas and Martin, 1980) and were developed using laboratory CPT and SPT on large samples of clean sands. Application of these laboratory results to natural soils may be limited. The  $CN$  presented in Equation A4 is similar to that proposed (Seed and others, 1977) for the effect of overburden on SPT blowcounts.

The friction ratio is not normalized based on the assumption that overburden pressure affects friction sleeve and cone tip resistance similarly. Since the quantities are divided by each other to compute friction ratio, overburden effects should cancel. Some experience (Olsen and Farr, 1986) indicates that this assumption may oversimplify actual conditions for deep soundings. The friction resistance may be less sensitive to overburden pressure than the cone tip resistance. Thus, in soundings deeper than about 100 ft, the friction ratio may gradually decrease with increased penetration, independent of any changes in soil conditions, other than overburden pressure. Due to the variability in overburden normalization curves, no specific correction for overburden pressure on friction ratio has been recommended or used for this study. For this study, effective stresses in Equation A4 were computed using assumed water tables and soil unit weights.

## A3.0 TEST DRAINAGE CONDITION

The CPT loading rate is such that drained and undrained conditions exist during testing of sands and clays, respectively. Partial drainage may occur in mixed (granular and fine grained) soils. CPTU piezometric data indicate that minor differences in cone tip and friction ratio response can correspond with major changes in pore water pressure response (Douglas and others, 1985). The complex volumetric strain field around the penetrometer (Davidson and Boghrat, 1983) precludes reliable geotechnical effective stress analysis of CPTU results in partially drained soil.

Empirical estimates of either drained or undrained parameters can be made in mixed soils. These parameters must not be combined and must be used alternatively. Combination of drained and undrained parameters will result in significant overestimation of in situ shear strength. Structure rate of loading will help determine whether drained or undrained parameters should be appropriate for design use. Depending on project needs and site conditions, geotechnical laboratory testing including consolidation and CU tests with pore pressure measurements will also be useful in assigning appropriate design parameters. Field instrumentation during construction using low volume change piezometers may be appropriate for some projects.

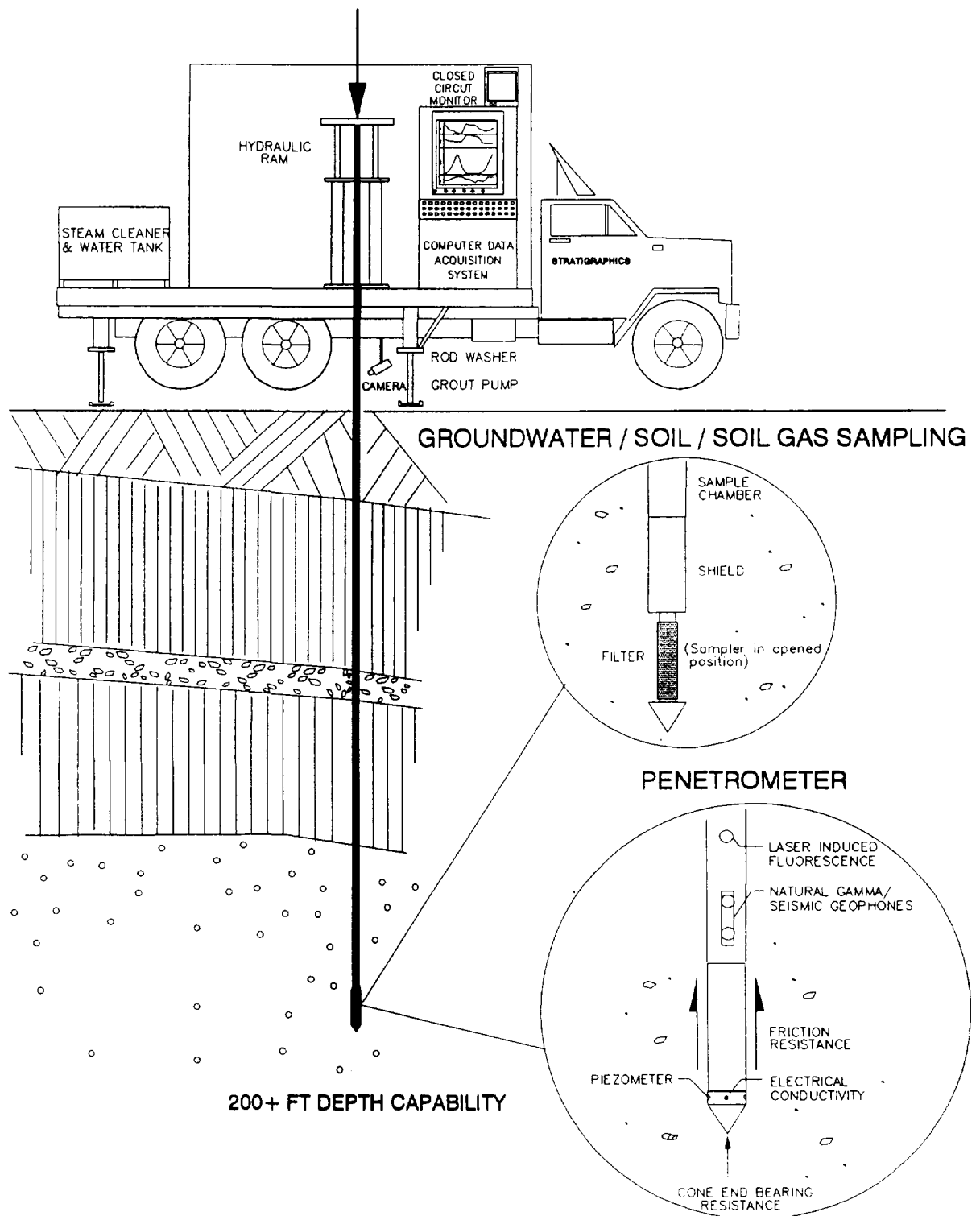
## A4.0 RECOMMENDED PRACTICES

The STRATIGRAPHICS data evaluation program uses a series of global correlation charts, Figures A2 through A6. Parameters are computer evaluated and tabulated at discrete intervals. Stratigraphic units should be defined on the basis of the continuous sounding logs and project requirements. The correlations are then used in evaluation of layer properties. Use of the tabulations without the review of the CPT sounding logs can lead to the choice of non-representative parameters, especially in interlayered deposits. It should be noted that taking discontinuous borehole soil samples also often provides a poor representation of subsurface conditions.

CPT correlations have been developed using empiricism. The data base is world-wide and includes decades of CPT experience. However, local conditions may differ from those in the global data base. Thus, the evaluated parameters should be viewed as indicating trends rather than as the exact equivalent of specific laboratory tests performed under boundary and drainage controlled conditions. The derived parameters are not intended to replace appropriate drilling and undisturbed sampling, other in situ and laboratory testing, and use of engineering judgment.

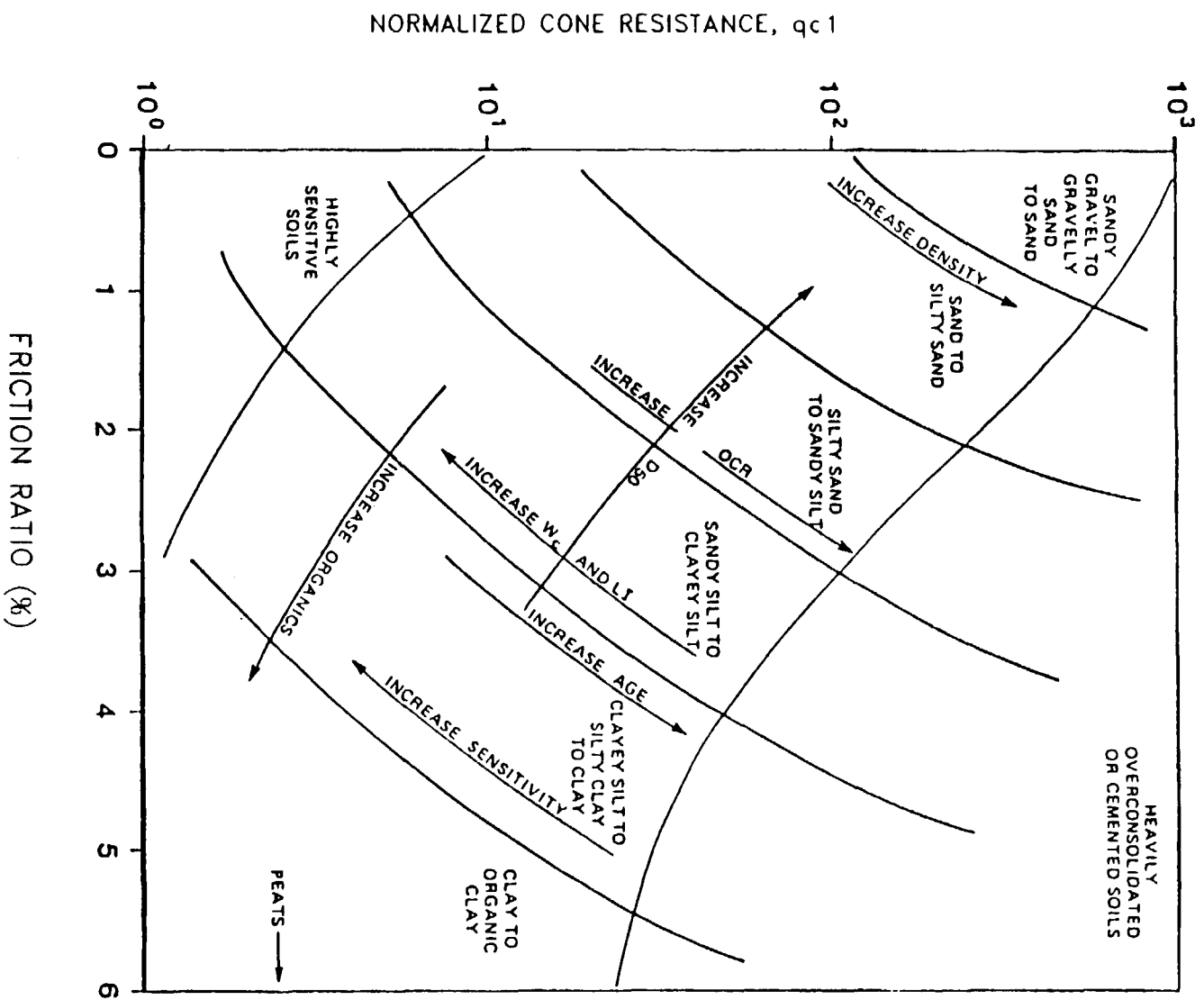
Review of CPT results and project requirements is used to define the need for additional information. Zones delineated by CPT (or, in fact, any other test) providing low factors of safety should be further explored. For example, high quality undisturbed sampling followed by geotechnical triaxial and consolidation testing may be indicated for low strength cohesive or partially drained mixed soil strata. Monitoring wells may be installed or groundwater samples taken in high hydraulic conductivity strata during geo-environmental exploration. Non-CPT test results can often be extrapolated across the site based on CPT evaluated stratigraphy.

## 24 AND 34 TON RIGS



## PENETROMETER EXPLORATION SYSTEM **STRATIGRAPHICS**

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SOIL BEHAVIOR TYPE CLASSIFICATION CHART

After Douglas and Olsen, 1981

STRATIGRAPHICS

# LOG NORMALIZED CONE END BEARING (TSF)

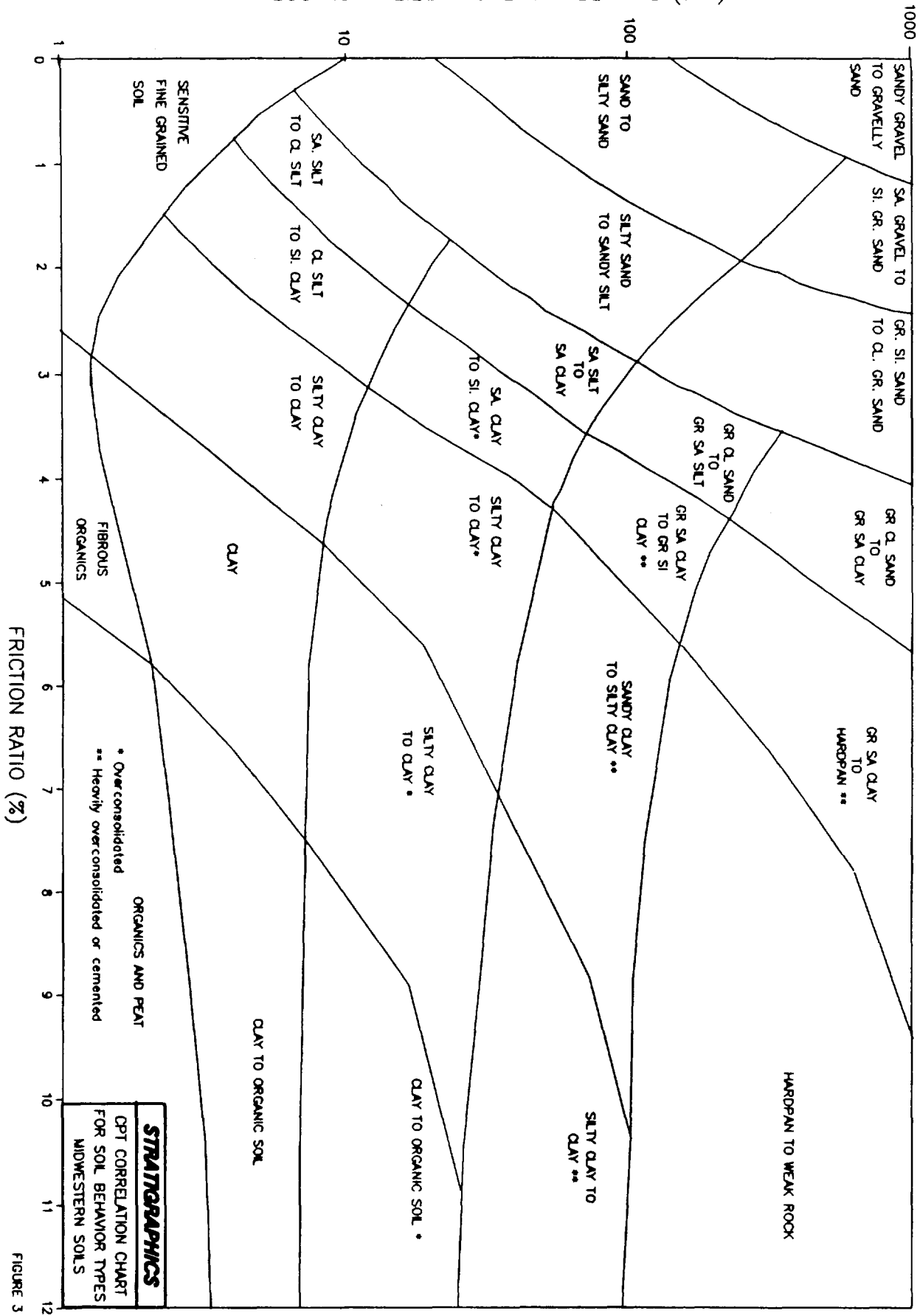
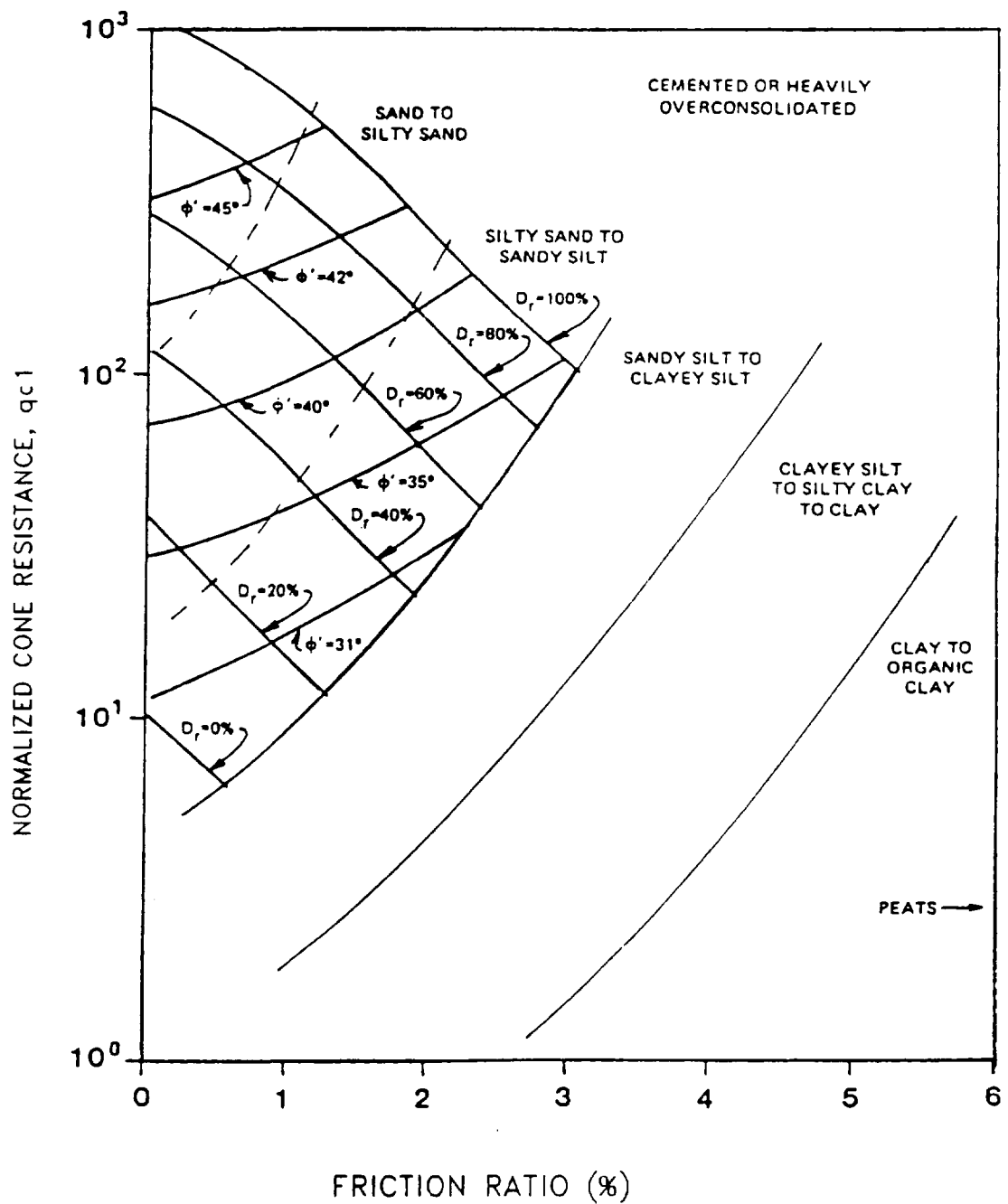


FIGURE 3

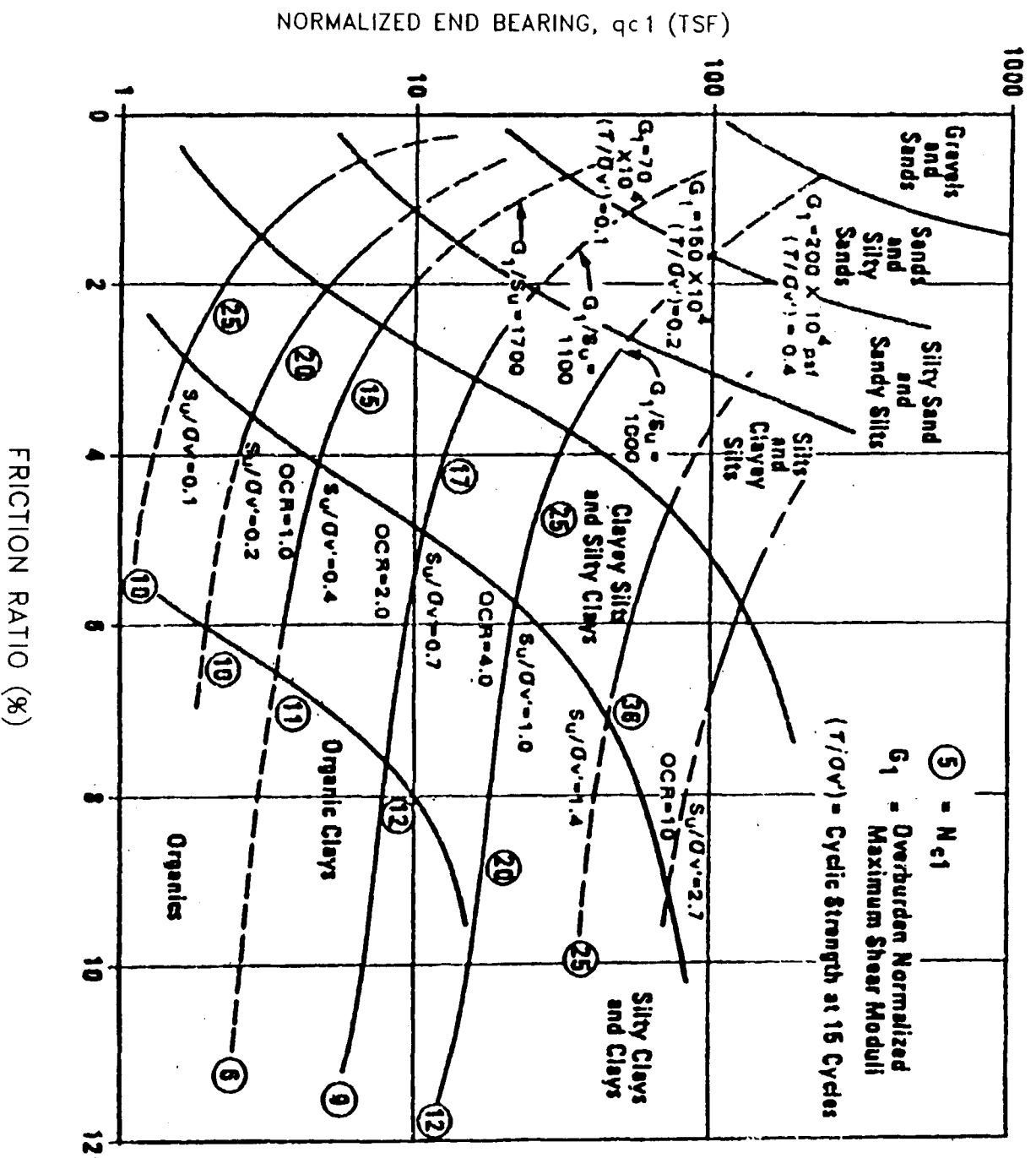


EXPANDED SOIL BEHAVIOR TYPE CLASSIFICATION CHART WITH EQUIVALENT OVERBURDEN NORMALIZED FRICTION ANGLE AND RELATIVE DENSITY TRENDS

After Douglas and Strutynsky, 1984

**STRATIGRAPHICS**





COMPOSITE TRENDS IN UNDRAINED SOIL PROPERTIES

After Douglas, Struynsky, et. al., 1985

STRATIGRAPHICS

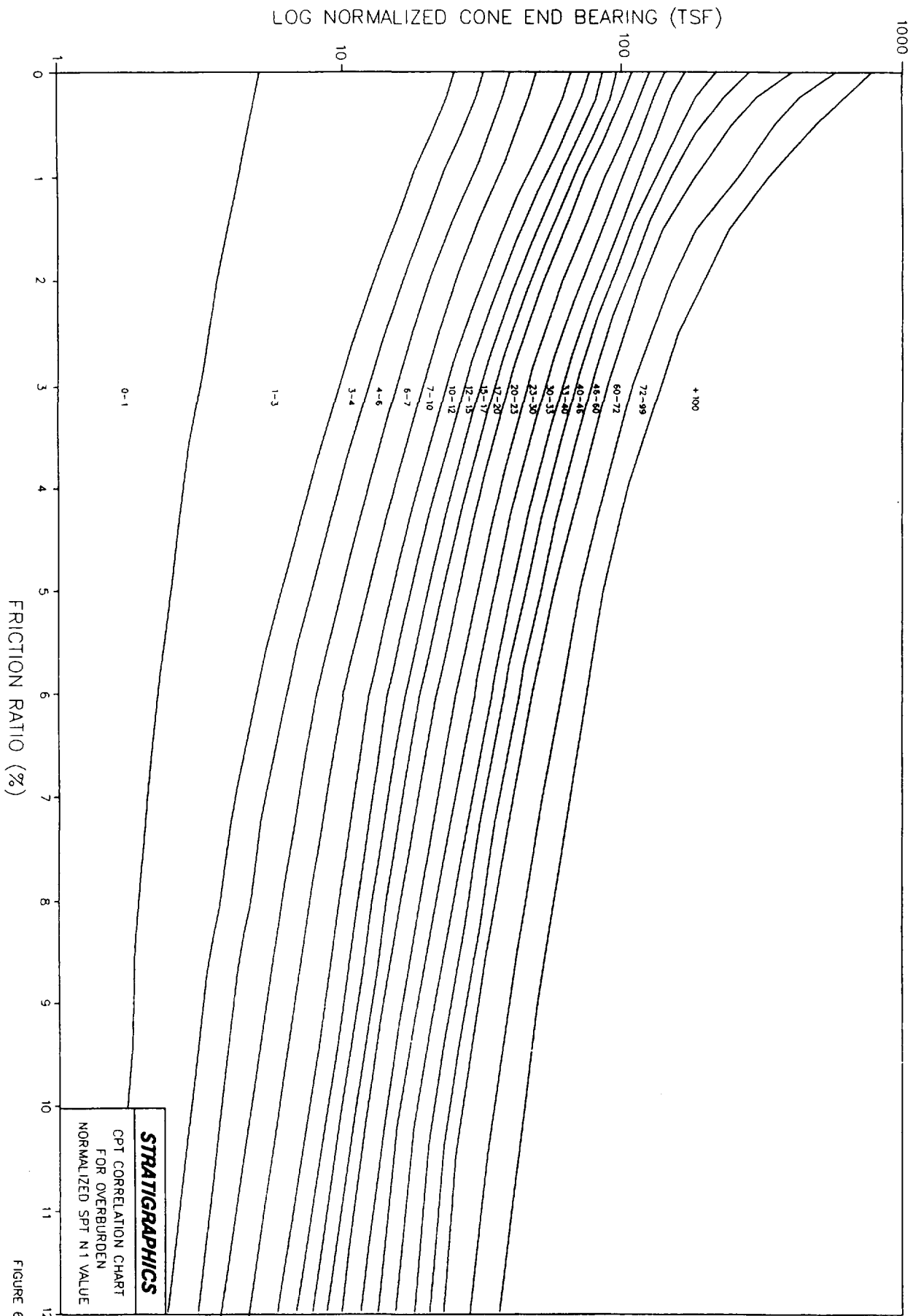


FIGURE 6

## APPENDIX B

from Baligh, M.M. and J. Levadoux, "Pore Pressure Dissipation After Cone Penetration," Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1980.

### 6.2.4 Evaluation of $c_h$ (probe)

At a given degree of consolidation, the predicted horizontal coefficient of consolidation  $c_h$  (probe) is obtained from the expression:  $c_h$  (probe) =  $R^2 T/t$  (6.2)

where  $R$  is the radius of the cone shaft,  $t$  is the measured time to reach this degree of consolidation; and  $T$  is the time factor. Table 5.1 provides values of  $T$  for different probe types at various degrees of consolidation.

An analytical method {equivalent to the graphical method described in Section 6.2.3} to check the validity of the prediction method consists of determining  $c_h$  at different dissipation stages, i.e., different  $u$ . Large differences between  $c_h$  at various degrees of consolidation indicate an inadequate initial distribution of excess pore pressure or significant coupling, or creep behavior.

The estimated values of  $c_h$  (probe) at 50% dissipation can be used in foundation problems involving horizontal water flow due to unloading or reloading of clays above the maximum past pressure. For problems involving vertical water flow in the overconsolidated range, the vertical coefficient of consolidation,  $c_v$ (probe), can be estimated from the expression:  $c_v$  (probe) =  $(k_v/k_h) c_h$  (probe) (6.3) where  $k_v$  and  $k_h$  are the vertical and horizontal coefficients of permeability, respectively. Reliable estimates of the in situ anisotropy of clays as expressed by the ratio  $k_h/k_v$  is difficult to determine in the laboratory because of the effects of sample size, sample disturbance, ... etc. and is the subject of controversy (Rowe, 1972; Casagrande and Poulos, 1969). In situ tests to determine  $k_h/k_v$  are almost nonexistent. Table 6.2 provides rough estimates of  $k_h/k_v$  for different clays.

### 6.2.5 Prediction of $k_h$ (probe)

Approximate estimates of the horizontal coefficient of permeability,  $k_h$  (probe), can be obtained from the expression:  $k_h$  (probe) =  $(g_w/2.3s_{vo}) * RR(\text{probe}) * c_h$  (probe) (6.4)

where  $s_{vo}$  is the initial vertical effective stress ( $\text{kg/cm}^2$ );  $g_w$  is the unit weight of water ( $=10^{-3} \text{ kg/cm}^3$ ); and  $RR(\text{probe})$  is the recompression ratio during early stages of consolidation (50% dissipation, say). Results in both the upper and lower Boston Blue Clays indicate that: the average  $RR(\text{probe}) = 10^{-2}$  (6.5) and generally  $0.5 * 10^{-2} < RR(\text{probe}) < 2 * 10^{-2}$  (6.6)

### 6.2.6 Prediction of $c_v(\text{NC})$

For foundation clays consolidated in the normally consolidated range, estimates of the coefficients of consolidation can be obtained from  $c_h$  (probe) by means of the expressions:

$$c_h(\text{NC}) = (RR(\text{probe})/CR) * c_h \text{ (probe)} \quad (6.7)$$

for horizontal water flow, and  $c_v(\text{NC}) = (RR(\text{probe})/CR) * (k_v/k_h) * c_h(\text{probe})$  (6.8) for vertical water flow.

The compression of ratio  $CR$  is the average slope of the strain vs. log effective stress plot in the appropriate effective stress range expected during consolidation of the foundation clay. Values of  $CR$  should be obtained from good quality samples carefully tested in the laboratory. Table 6.2 provides rough estimates of  $CR$  based on empirical correlation with index properties of various clays.

### Table 6.2 Empirical Correlation and Typical Properties of Clays

#### 1. Compression Ratio $CR$ (from Ladd, 1973)

$CR = C_c/(1+e_o)$  = slope of the strain vs. log stress curve

$e_o$  = initial void ratio

$c_c$  = virgin compression index = slope of  $e$  vs. log stress

$w_L$  = liquid limit

$w_N$  = natural water content

$C_c = 0.009 (w_L\% - 10\%)$

Terzaghi and Peck (1967)

$C_c = 0.54 (e_o - 0.35)$

Nishida (1958)

$C_c = 0.01 \text{ to } 0.15 (w_N\%)$

MPMR (1958)

$C_c = 0.6 (e_o - 1)$  for  $e_o < 6$

$C_c = 0.85 (e_o - 2)$  for  $6 < e_o < 14$

Kapp, (1966)

#### 2. Anisotropic Permeability of Clays (from Ladd, 1976)

Nature of Clay

$k_h/k_v$

1. No evidence of layering

1.2 +/- 0.2

2. Slight layering, e.g., sedimentary clays with occasional silt dustings to random lenses

2 to 5

3. Varved clays in northeastern U.S.

10 +/- 5

## **ATTACHMENT 2**

**Geoprobe® Logs**

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Deerfield, Illinois 60015

## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-1**

TOTAL DEPTH: **24 feet**

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/5/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N921807.810 E7225952.143**

GROUND SURFACE ELEVATION: **887.966**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
------------------	------------------	-------------	-----------	------------	-------------	------	------------------	------------------

0-4	3.3	1		0		ML	1.6	CLAYEY SILT: clayey silt loam-brown, wet
						CL		SILTY CLAY: till, little sand-brown, moist
4-8	3	3		-5		CL	5.2	SILTY CLAY: till, trace sand-gray, moist
8-12	3	0.9		-10		SP	10	SAND: medium to coarse sand, some gravel, with seam of gravel at -12 ft. to -13 ft, trace silt and clay-gray, wet
12-16	2.7	2.2		-15		ML	13	SILT: silt, little sand-gray
16-20	2.4	0		-20		GP	17	SAND AND GRAVEL: small to medium gravel and coarse sand-gray, wet
20-24	4	0						

# ENVIRON

740 Waukegan Rd., Suite 401  
Deerfield, Illinois 60015

## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-2**

TOTAL DEPTH: **24 feet**

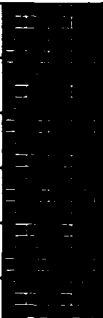
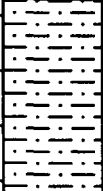
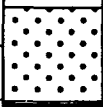


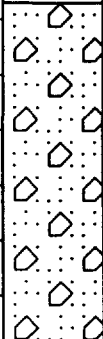
PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/5/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N921849.094 E725956.798**

GROUND SURFACE ELEVATION: **887.713**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
------------------	------------------	-------------	-----------	------------	-------------	------	------------------	------------------

0-4	3.5	0		0		CL	5.7	SILTY CLAY: trace sand and gravel-brown
4-8	3.6	0		-5		ML	9.3	SILT: clayey silt-gray, moist
8-12	3.5	3.5		-10		SP	11	SAND: fine sand, trace clay-gray, wet
12-16	3.6	0		-15		CL	16.3	SILTY CLAY: trace gravel-gray, with seam of clayey silt at -15 ft. to -16.3 ft., moist
16-20	3.2	0		-20		SP	17.7	SAND: coarse sand, little very coarse, wet
20-24	--	0		-20		SP		SAND AND GRAVEL: coarse sand and small gravel-gray, wet

# ENVIRON

740 Waukegan Rd., Suite 401  
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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-3**

TOTAL DEPTH: **24 feet**

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N921882.044 E725957.480**

GROUND SURFACE ELEVATION: **887.859**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	3.9	0	0	0	CL-ML	2.4	CLAYEY SILT: loam-brown, trace small gravel-moist to very moist
4-8	3.6	0	0	-5	CL	5	SILTY CLAY: trace gravel-brown, moist
8-12	2.4	0	0	-10	CL	15.2	SILTY CLAY: trace sand and gravel-gray, moist
12-16	3.5	0	0	-15	SP	18	SAND: medium to coarse sand, trace gravel-gray, wet
16-20	2	0	0	-20	SP		SAND AND GRAVEL: gray, wet
20-24	3.6	0	0				

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-4**

TOTAL DEPTH: **24 feet**


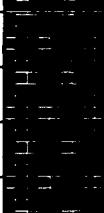
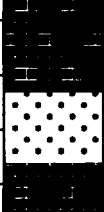
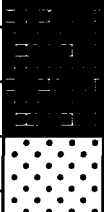
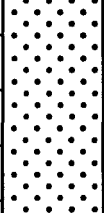
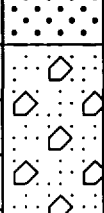
PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N921925.427 E725954.276**

GROUND SURFACE ELEVATION: **888.182**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	4		0	0		CL	4	SILTY CLAY: trace gravel-brown, moist to very moist
4-8	3.8		80	-5		CL	9.3	SILTY CLAY: trace sand and gravel-gray, moist
8-12	3		10	-10		SP	10.6	SAND: fine to medium sand with coarse sand, trace silty clay, very moist
12-16	3.3		0	-15		CL	14	SILTY CLAY: trace sand and gravel-gray, moist
16-20	3.4		0	-20		SP	20	SAND: coarse sand, little medium sand, trace gravel-wet
20-24	3.1		0			SP		SAND AND GRAVEL: wet



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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-5**

TOTAL DEPTH: **24 feet**









PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N921964.252 E725963.949**

GROUND SURFACE ELEVATION: **887.285**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
------------------	------------------	-------------	-----------	------------	-------------	------	------------------	------------------

0-4	3.7			0		CL	1.1	SILTY CLAY: loam-brown, very moist to wet
						CL-ML	4.4	CLAYEY SILT: little sand and gravel, moist
4-8	3.1	45		-5		CL		SILTY CLAY: little sand-gray, moist
8-12	3	15		-10		SP	9.6 10.1	SAND: fine to medium sand, some coarse sand-gray, wet
						CL		SILTY CLAY: trace gravel-gray, moist
12-16	3.2	0		-15			13.1	SAND: coarse sand, little fine to medium sand and gravel-gray, wet
16-20	3	0		-20		SP		
20-24	3.2	0						

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-6**

TOTAL DEPTH: **24 feet**

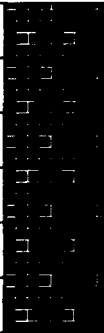
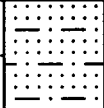

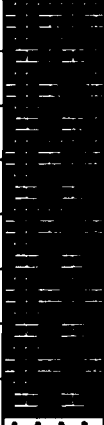

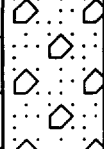
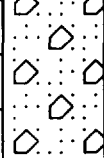
PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N922001.999 E725965.156**

GROUND SURFACE ELEVATION: **887.554**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	3.8	0	0	0		CL	0	SILTY CLAY: little sand-brown, moist
4-8	4	0	0	-5		CL-ML	6	CLAYEY SILT: trace sand and clay-gray, moist
						SP	8	SAND: fine sand, some medium sand and gravel-brownish gray, wet
8-12	3.7	0	0	-10		CL	8.8	SILTY CLAY: little sand and gravel-gray, moist
12-16	4	0	0	-15		CL	16.7	SAND: coarse sand and fine gravel-gray, wet
16-20	3	0	0	-20		SP	18.3	SAND AND GRAVEL: some very coarse sand, wet
20-24	3.3	0	0	-20		SP		

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-8**  
TOTAL DEPTH: **24 feet**


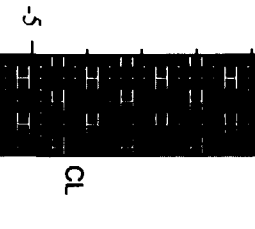
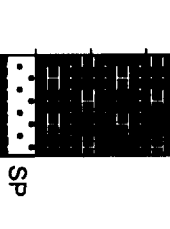
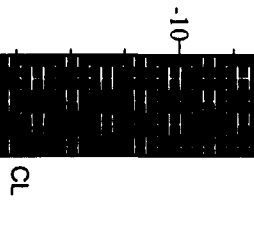
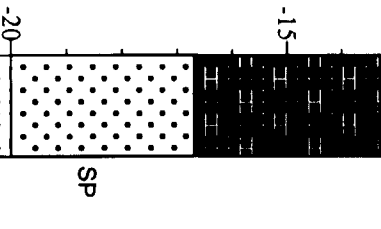
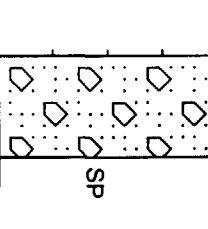
PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, L.P.C.**  
DATES DRILLED: **6/7/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N922082.804 E725964.536**

GROUND SURFACE ELEVATION: **887.853**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	3.7	0				CL		SILTY CLAY: trace sand-brown, moist
4-8	4	1.5				CL		
8-12	3.6	20				SP	8	SAND: fine sand, with silty clay-gray, wet
12-16	4	0				CL		SILTY CLAY: trace sand and gravel-gray, moist
16-20	3.6	0				SP	16.7	SAND: coarse sand, little very coarse sand, trace gravel-gray, wet
20-24	.5	0				SP	20	SAND AND GRAVEL: wet

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-12**

TOTAL DEPTH: **24 feet**

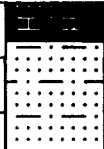
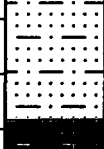


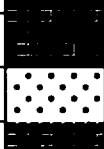

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N922242.934 E725961.740**

GROUND SURFACE ELEVATION: **888.143**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	4		0	0		CL	0.7	SILTY CLAY: loam, trace sand and gravel-brown, moist CLAYEY SILT: little sand and gravel-brown, moist
4-8	4		0	-5		CL-ML	4.8	SILTY CLAY: little sand and gravel-brown to gray, moist
8-12	4		0	-10		CL	12	SAND: coarse sand with medium sand-gray, wet
12-16	3.5		0	-15		CL	13	SILTY CLAY: little sand and gravel-gray, moist
16-20	2.6		0	-20		SP	16.8	SAND: medium to coarse sand, little very coarse sand-wet
20-24	3.4		0	-21.3		SP	21.3	SAND AND GRAVEL: wet

# ENVIRON

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **EST-GP-13**

TOTAL DEPTH: **24 feet**

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION: **N922284.303 E725962.092**

GROUND SURFACE ELEVATION: **888.423**

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
0-4	4		0	0		CL	3.8	SILTY CLAY: little sand and gravel-brown, moist
				-5		CL-ML	5.3	CLAYEY SILT: trace sand-brown, moist
4-8	4		0			CL		SILTY CLAY: trace sand-brown to gray, moist
8-12	4		0	-10		CL		
				-13.5		SP	13.5	
12-16	3.8		0	-15		CL	13.8	SAND: coarse sand-gray, wet
						SP	16.9	SILTY CLAY: trace sand-gray, moist
16-20	3.6		0			CL	17.3	SAND: fine sand, little clay and coarse sand, wet
						SP	19.2	SILTY CLAY: trace sand-gray, moist
20-24	3.2		0	-20		SP		SAND AND GRAVEL: wet

# ENVIRON

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-1**

TOTAL DEPTH: **20 feet**

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	2		0	0	CL	0.4	SILTY CLAY: brown, very moist
					GP-SM	2.5	SILTY SAND: gravel fill and silty clayey sand, little gravel-brown, moist
					CL	5.2	SILTY CLAY: trace sand-dark brown, very moist
4-8	2.2		0	-5	CL	8.6	SILTY CLAY: trace sand-gray, moist
					SM	9.3	SILTY SAND: silty clayey sand, little fine gravel, wet
8-12	2.8		0	-10	SP	14.1	SAND: coarse sand, light grayish, brown and black, wet with seam of silty sand at -15 ft.
12-16	3.6		.5	-15	CL	17.3	SILTY CLAY: little gravel-brownish gray, moist
16-20	4		0	-20	SP		SAND: coarse sand, wet with seam of silty clay noted at -17.9 ft. to -18.6 ft.

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-2**

TOTAL DEPTH: **20 feet**


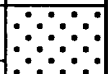
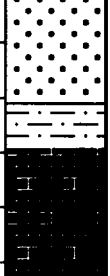
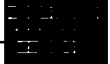
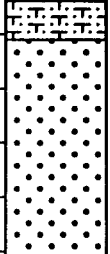

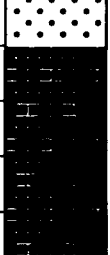

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/6/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	2.8		0	0		GM	1.2	GRAVEL: limestone gravel fill
						ML	2	SILT: clayey silt, little sand-gray
						SP	5.1	SAND: fine sand and silty sand, trace clay, moist
4-8	3.2		0	-5		ML	5.9	SILT: clayey silt-brown, wet
						CL	9.4	SILTY CLAY: little sand-brown and gray, moist
8-12	3.1		.5	-10		SM	10.1	SILTY SAND: silty clayey sand, trace gravel-gray
						SP	16	SAND: coarse sand, little gravel-gray brown, wet, with layer of silty clayey sand at -15 ft. to -15.3 ft.
12-16	3		0	-15		CL		SILTY CLAY: little sand-light gray, moist
16-20	3.8		0	-20				

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## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-3**

TOTAL DEPTH: **20 feet**


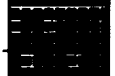










PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/7/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **MacrosamplerPiston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
------------------	------------------	-------------	-----------	------------	-------------	------	------------------	------------------

0-4	3		0	0		CL-GP	2.2	SILTY CLAY: fill at surface, with layer of limestone gravel at 0 ft. to -0.8 ft., very moist
						CL	3.5	SILTY CLAY: trace gravel-gray, moist
						CL	5.3	SILTY CLAY: trace gravel-brown, moist to very moist
4-8	2.8		0	-5		SP	5.7	SAND: medium to coarse sand with clay-gray, very moist
						CL	8.2	SILTY CLAY: trace sand-gray, very moist
8-12	3.9		3	-10		CL	11.6	SILTY CLAY: trace gravel-brown, mottled and changing to gray, moist
						SM-SF	14	SAND: fine to coarse sand with silty clay at -11.6 ft. to -11.9 ft.-gray, wet, with gravel and sand from -13.7 ft. to 14 ft.-black
12-16	3		0	-15		CL	15	SILTY CLAY: trace gravel-gray, moist
						SP	16.6	SAND: fine to medium sand-gray, wet
						CL	17.4	SILTY CLAY: little sand and gravel, moist
16-20	3.8		0	-20		SP	18.1	SAND: coarse sand, wet
						CL		SILTY CLAY: little sand and gravel, moist



# ENVIRON

740 Waukegan Rd., Suite 401  
Deerfield, Illinois 60015

## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-3**

TOTAL DEPTH: **20 feet**

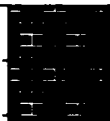
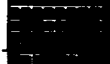












PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/7/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **MacrosamplerPiston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	3		0	0		CL-GP	2.2	SILTY CLAY: fill at surface, with layer of limestone gravel at 0 ft. to -0.8 ft., very moist
						CL	3.5	SILTY CLAY: trace gravel-gray, moist
						CL	5.3	SILTY CLAY: trace gravel-brown, moist to very moist
4-8	2.8		0	-5		SP	5.7	SAND: medium to coarse sand with clay-gray, very moist
						CL	8.2	SILTY CLAY: trace sand-gray, very moist
						CL		
8-12	3.9		3	-10		CL		SILTY CLAY: trace gravel-brown, mottled and changing to gray, moist
						SM-SP	11.6	SAND: fine to coarse sand with silty clay at -11.6 ft. to -11.9 ft.-gray, wet, with gravel and sand from -13.7 ft. to 14 ft.-black
12-16	3		0	-15		CL	14	SILTY CLAY: trace gravel-gray, moist
						SP	15	SAND: fine to medium sand-gray, wet
						CL	16.6	SILTY CLAY: little sand and gravel, moist
16-20	3.8		0	-18		SP	17.4	SAND: coarse sand, wet
						CL	18.1	SILTY CLAY: little sand and gravel, moist
						CL		

# ENVIRON

740 Waukegan Rd., Suite 401  
Deerfield, Illinois 60015

## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-4**

TOTAL DEPTH: **20 feet**

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/7/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	2	0	0	0	CL-GP	1	0	SILTY CLAY: fill with layer of limestone gravel at -0.3 ft. to -1 ft.
4-8	2.6	0	0	-5	CL	6.2	-5	SILTY CLAY: trace sand-gray, moist
8-12	3	0	0	-10	SP		-10	SAND: coarse sand changing to sand and gravel at -12 ft., wet below -9 ft., with layer of sandy clay at -8 ft. to -8.9 ft.-brown to gray
12-16	2.2	0	0	-15	CL	16	-15	SILTY CLAY: sandy silty clay-gray
16-20	4	0	0	-20	CL	16.9	-16.9	SILTY CLAY: trace gravel-brownish gray, moist

# ENVIRON

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Deerfield, Illinois 60015

## GEOLOGIC DRILL LOG

BOREHOLE NO.: **HS-2-GP-5**

TOTAL DEPTH: **20 feet**

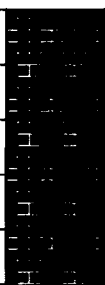

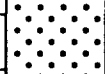
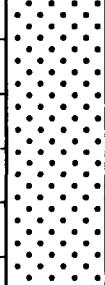
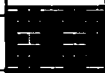

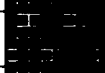

PROJECT: **ECC Additional Work**  
SITE LOCATION: **Zionsville, Indiana**  
JOB NO.: **21-6585B**  
LOGGED BY: **Doug Burge, LPG**  
DATES DRILLED: **6/7/02**

DRILLING CO.: **Earth Exploration, Inc.**  
RIG TYPE: **Geoprobe**  
METHOD OF DRILLING: **Geoprobe**  
SAMPLING METHODS: **Macrosampler/Piston Sampler**  
HAMMER WT./DROP: **--**

SURVEY LOCATION:

GROUND SURFACE ELEVATION:

SS INTERVAL (ft)	SS RECOVERY (ft)	BLOW COUNTS	PID (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS	LAYER DEPTH (ft)	SOIL DESCRIPTION
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0-4	2.4		0	0		CL		SILTY CLAY: silty clay fill at surface with layer of limestone gravel at -0.3 ft. to -1 ft. underlain by dark gray silty clay, moist
4-8	3.3		0	-5		SP	5.2	SAND: fine sand with silt, some clay-gray, wet
						CL	5.8	SILTY CLAY: little sand, moist to very moist
						SM-SF	6.7	SAND: clayey silty sand, wet, changing to sand and gravel at -10.5 ft.-brown to gray, wet
8-12	3		0	-10				
						CL	13.8	SILTY CLAY: trace gravel-gray, moist
12-16	2.7		0	-15		SP	16	SAND: fine sand
						CL	16.4	SILTY CLAY: trace gravel-gray, moist
16-20	4		0	-20	